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THE DEVELOPMENT OF FOLK AND COMPLEX CULTURES IN THE SOUTHERN MAYA AREA

STEPHAN F. DE BORHEGYI*

TWO generations of intensive archaeological work conducted in great part by the Carnegie Institution of Washington in the Southern Maya area have resulted in a wealth of factual information and the establishment of a fairly comprehensive and continuous cultural sequence. In spite of the many facts, few attempts have been made by Middle American archaeologists to synthesize this data and present it within a coherent conceptual framework. The reluctance of Middle Americanists to extract from the factual data theories regarding the recurring regularities of human behavior may be due in part to the feeling that such "theorizing" is purely speculative and unscientific. The picture is further complicated by the fact that in the Maya area the great bulk of the archaeological material collected and studied consists of artifacts from the excavations of mounds and tombs in the large ceremonial and urban centers. This material understandably does not represent the totality of the culture concerned. It is generally recognized, however, that the content of science is not made up entirely of facts. Facts, themselves, are simply piles of bricks which alone, although impressive, have no meaning until assembled to make up a building. The general tendency among archaeologists is to favor the brick makers and to scorn the masons, in spite of the obvious fact that no building is possible without the efforts of both. This is not to say that "theorizing" has been completely neglected in the writings of Middle American archaeologists. Many pages have been devoted to discussions of the uniqueness of certain important events in Maya or Aztec history, but few further inferences have been drawn to explain what trends there have been toward universal similarities in human behavior. That studies of this kind are so few may be due to the fact that it has not always been recognized that the same conceptual tools used for historical reconstruction can be used equally well for a scientific approach to the interpretation of human behavior.

Recognizing this "conceptual poverty" in the writings of Middle American archaeologists, Kluckhohn (1940: 43) warns us that

> . . . unless archaeologists treat their work quite firmly as part of a general attempt to understand human behavior they will, before many generations, find themselves classed with Aldous Huxley's figure who devoted his life to writing a history of the three-pronged fork.

Since I have devoted much of my time to writing the history of the "three-pronged incense burner" (de Borhegyi 1950*b*, 1951*a*, 1951*c*, 1955), I feel particularly uncomfortable with Kluckhohn's comparison. However, after a prolonged study of these ceremonial vessels which were used throughout the history of the Southern Maya, I came to the conclusion that the inferences gathered from this study may present us with a provocative culture and sociological problem. These incense burners, along with other cult objects such as figurines, effigy whistles, and "rimhead" vessels, were probably used in connection with a simple agricultural, nature, and fertility cult. They formed what I believe to have been the core of a simple animistic *folk cult* and are in great contrast to the more sophisticated and stylized objects used in the complex religious rituals of the later periods. They were, in all probability, the prized private possessions of families and kin-

* This study, prompted by Kluckhohn's stimulating article (1940), has profited from the constructive criticism of A. V. Kidder, Erik K. Reed, and Sol Tax as well as from many informal and stimulating discussions with the members of the Carnegie Institution of Washington in Guatemala. The study in its incipient form was first presented in 1953 at the 52nd Annual Meeting of the American Anthropological Association at Tucson, Arizona, and in this form was published in 1954 by the Pan American Union in *Ciencias Sociales*. Research on the subject was conducted under a Bollingen Foundation (New York) grant-in-aid.

group heads and may have been used in a personalized way to attract, control, and placate the supernatural forces. The fact that these ceremonial vessels and cult objects persisted throughout the history of the Southern Maya but have so rarely been found within the sacred confines of the ceremonial precincts suggests that they were favored by the folk component of the society and frowned upon by the more sophisticated members of the upper classes. There must, therefore, have existed in the Southern Maya area communities composed of both a folk and a complex component. Within the community each component with its distinct culture apparently lived side by side over a time span of more than 2 millennia without too greatly influencing the patterns of beliefs and values of the other. Through a study of

FIG. 107. Map of the southern Maya area. *A*, tropical rain forest area; *B*, hilly middle country (*1*, Chama; *2*, Chipal; *3*, Chipok); *C*, western volcanic highlands (*4*, Zaculeu; *5*, Zacualpa; *6*, Salcaja; *7*, Chuitinamit; *8*, Chukumuk); *D*, central volcanic highlands (*9*, Terrenos; *10*, Kaminaljuyú; *11*, Chinautla); *E*, semi-arid eastern lowlands (*12*, San Augustín); *F*, Pacific coastal plain (*13*, Champerico; *14*, Tiquisate; *15*, El Baul; *16*, Finca Arizona).

these cult objects we may learn more about the development of folk and complex cultures in general and the inferences gained thereby may give us a better understanding of the factors which govern human behavior under specified conditions.

To best present the various stages in the development of folk and complex cultures in the Southern Maya area, this synthesis will be presented in a conceptual framework which will embrace both space and time factors. In the following 6 arbitrary time divisions I have concerned myself primarily with the central highland section of Guatemala. This limitation has been imposed not so much because the area is more typical than the others but because it is much better known archaeologically, due to the considerable number of scientifically controlled excavations. Occasional reference will be made, however, to the tropical rain forest, Pacific coastal plains, and hilly middle country regions, although they are not of primary concern to this study. The dates assigned to each period follow, with slight modifications, the chronology presented by Shook (1952), since the recent implications of radiocarbon datings in other areas of Middle America are still tentative (Wauchope 1954).

Historical Perspective in the Southern Maya Culture Area

The Southern Maya culture area, including the state of Chiapas in Mexico, Guatemala, British Honduras, the eastern parts of El Salvador, and Honduras, can be divided roughly into the following 6 geographical and cultural units: tropical rain forest area, hilly middle country, western highlands, central volcanic highlands, semi-arid eastern lowlands, and Pacific coastal plains (Fig. 107). The historical and cultural development of the Southern Maya area has been discussed by Armillas (1948, 1951), de Borhegyi (1950*a*, 1954*a*, 1954*b*), Shook (1951), Thompson (1943, 1954), and Wauchope (1950).

1. *The Early or Village Formative Period (2000 B.C. to 1000 B.C.).* The archaeological phases associated with this period are: Las Charcas, Arevalo, Majadas, Providencia (Valley of Guatemala); Zakat, Xaraxong (Almolonga Valley); and Salcaja 1 (western highlands).

By 2000 B.C. there was, in the Southern Maya area, a sedentary way of life based on a primitive method of agriculture. Cotton and various food plants, primarily corn and beans and later squash and avocado, were cultivated. Stone metates and manos for grinding grain as well as clay griddles (comales) are present in the earliest archaeological strata discovered to date in the area. Although the archaeological evidence indicates that life was greatly simplified with a stable food supply thus assured, the labors and plans of these early food producers were still thwarted by natural events beyond their control.

In time, a simple, realistic form of family or kin-group ritual developed to control and placate these forces of nature centering about agriculture, rain, and fertility. Probably every manifestation of nature had its local spirit and many were venerated individually by means of special rituals. These rites were conducted to ensure the multiplication and safekeeping of animals, plants, and human beings and had the practical function of providing an opportunity for the periodic reunion of kin groups. The personalized and individualistic approach to the supernatural can be inferred from the appearance of the cult objects and vessels produced during this Early Formative period.

Examples of these cult objects are the frequently spike-decorated incense burners surmounted by 3 effigy prongs. Most of the effigy prongs seem to represent aged and bearded individuals, many of them with "tear streaks" represented by deep incisions below the eyes (de Borhegyi 1950*b*, 1951*a*, 1951*c*). The tear streaks very likely symbolized rain. Also produced in adundance were the predominantly solid, hand-modeled clay female and monkey figurines as well as effigy whistles in the form of birds or animals. These latter may have been used in magical ceremonies to ensure a successful hunt. The usually nude pregnant figurines, on the other hand, seem to represent the reproductive power of nature and woman. The early Maya food producers must have relied heavily upon the help and guidance of the rain and earth gods to assure the local food supply, and understandably the representations of these gods, depicted on the effigy prongs as aged and bearded men, were of great importance to the community. The help of these gods was probably invoked by means of sympathetic magic during family and communal ceremonies.

It is important to note that these cult objects were made in a decidedly individualistic and realistic manner. Although certain features common to all of them (such as the beard, tear streaks, or a swollen abdomen in the case of the female figurines) must have been magical properties considered essential for the proper functioning of these objects, no two have been found to be identical or even very closely alike. It is fair to assume that through these objects, the individual farmer, village shaman, or kin-group head thought to contact, conciliate, and control the supernatural, probably more often for individual than for communal ends. If the many and varied cylindrical and flat clay stamps produced during the same period were used to mark private ownership, this would also indicate that personal needs were of more immediate concern to the individual than was the well-being of the community as a whole. From the large quantity of these cult objects it can be inferred that they played an important role in the everyday life of these simple, sedentary food producers and eventually formed an integral part of the self-contained way of life referred to earlier as a folk culture.

The sedentary life of these early food producers provided opportunities for improved housing conditions and paved the way for village planning. The settlement pattern of this formative period was probably the unplanned autonomous village unit. Although no house mounds have yet been excavated, we know that in the Guatemalan midwestern highlands, dwellings were made of pole and thatch with walls partially daubed with adobe (Shook 1951: 97). These huts were probably arranged at random throughout the village area. Near these village concentrations 3 to 4 m.-deep cone- or bottle-shaped pits with circular orifices were dug through the sterile surface soil into the underlying volcanic ash. Some may have served the villagers as sweat baths for ritual purification, but more probably they were food storage chambers to house the growing larder of agricultural products. While many were left empty, others were filled with household debris and occasionally even with simple burials. Apparently no burial mounds were constructed during this period. The few pit burials found are sparsely furnished with food containers and personal ornaments and give no indication of accumulated wealth. The struggle for livelihood could have permitted little if any social stratification but the fairly diverse archaeological inventory of stone and clay artifacts and jade, bone, and shell ornaments along with traces of basketry and extensive obsidian workshops, suggests the emergence of a class of specialists, the first men to be supported out of a surplus of foodstuffs.

The growth of these early food producing communities was eventually limited by their own economy. The expansion in numbers involved expansion in space. Additional families could be supported only if more arable land was available for cultivation. Thus each self-sufficient village unit gradually put forth more and more daughter villages.

It is difficult, however, to speak of a uniform "Early Middle American Formative Culture." It would perhaps be more accurate to think in terms of a multitude of different local formative or folk cultures all on the same level of cultural complexity. Practically every village unit must have represented an adaptation to a specific environment with an ideology more or less indigenous to it. The archaeological inventories of tools and culinary objects testify to this fact. The relative abundance of clay comales in the earliest archaeological strata in the highlands and their complete absence in the rain forest and hilly middle country seem to indicate regional variations in the preparation of basic food products or possibly even completely different dietary habits. On the other hand, the archaeological list of ceremonial paraphernalia, as discussed previously, shows sufficient uniformity to indicate that the pooling of human experience had been accelerated by intercommunication in the Southern Maya area at least as early as 1000 B.C.

2. *The Late or "Urban" Formative Period (1000 B.C. to A.D. 200).* The archaeological phases associated with this period are: Miraflores, Arenal, Santa Clara (Valley of Guatemala); Terrenos Altos (Almolonga Valley); Chukumuk 1 (Late Atitlan); Salcaja 2 (western highlands); Chama 1A (Chixoy drainage, west); Finca Arizona, Champerico (Pacific coast).

The beginning of this period saw the appearance of large and elaborate burial and temple mounds arranged along narrow, elongated, rectangular plazas. The 2 parallel plazas were separated by a row of buildings and were

oriented roughly northeastward. These platform mounds or earthen pyramids, some of them as high as 20 m., were built of puddled adobe without the use of stone or lime mortar (Shook and Kidder 1952). They were covered with brightly colored adobe plaster and supported perishable structures which probably served as temple shrines. At several highland sites plain stone monuments have been found, usually located to the east of the main pyramid. Although these monuments are plain, they may have been used for marking time, a preoccupation which never seems to have achieved the magnitude in the highlands that it did in the tropical rain forest area.

The organized planning of the mounds and plazas shows the definite concept of a ceremonial precinct, a sacred enclosure from which the village life seems to have been excluded. Within these mounds the bodies of important personages were interred in rectangular burial chambers, sometimes superimposed one upon another. These death chambers, roofed and supported by posts and cross beams, contained the principal body on a wooden platform, many lavish offerings together with the bodies of sacrificed animals and, frequently, human retainers. The existence of these temple mounds presupposes a probably small but active priestly group and a considerable engineering knowledge while the presence of rich burial furniture argues for accumulated wealth concentrated in the hands of certain individuals. The development of these apparently socially sanctioned customs definitely indicates the beginning of social stratification among the Southern Mayas and suggests speculation to a considerable degree on a life after death, the inevitable result of man's quest for immortality. These customs also seem to argue for the presence of organized and directed ceremonies, probably following an annual pattern based on the agricultural or life cycle. The foundation of these advanced concepts must have been an abstract philosophy. Such a philosophy could have developed only in a society whose subsistence was based on intensified local food production, the preservation and storage of surplus food and commodities, and organized trade. The more efficient form of agriculture was undoubtedly made possible in great part by the evolving concept of a calendar.

At this time there is noticeable among the material remains such a variety of elaborate containers and tools that a considerable number of individuals must have been engaged in nonfood producing activities. Priests, craftsmen, and traders were most probably completely withdrawn from direct food production and eventually formed a separate class. Thus we can see elements of complexity developing within the culture.

The fact that the ceremonies and rituals were organized, and that the gods were being standardized, is evident from the changed appearance of the cult objects and ritual vessels of the period. The 3-pronged incense burners, handmade "archaic" figurines, and effigy whistles manufactured at this time were much more conventionalized and one can easily find duplicates among them. The spiked decoration disappears, the prongs are plain, and the walls of the censers depict conventionalized grotesque and even monstrous forms with thick upper lips and overhanging fangs, believed to be feline (jaguar) or reptilian deities. This is obviously at variance with the realism of former days. An offshoot of the 3-pronged incense burner, the highly standardized "rimhead" vessel, also came into use (de Borhegyi 1950*b*, 1951*c*). None of these cult objects were found in tombs, however, suggesting that although they had become more conventionalized and widely accepted they were still essentially the property of the folk and were probably rejected by the developing upper classes.

It seems that the individualistic religious approach to the supernatural, at least within the sacred enclosures, was replaced by a more rigid, depersonalized ceremonial discipline. Security was no longer in the hands of the individual. Both the future and earthly existence of man was controlled by a small group of specialists who had achieved a monopoly of magical power and were regarded as intermediaries between god and man. This profitable occupation permitted the concentration of wealth within a specialized class and easily permitted the organization of a theocratic state.

During this period monumental building activities were carried out in the service of the supernatural and the dead. Great labor battalions must have been readily available for such extensive public works as the erection of huge earthen pyramids. This manpower could have been recruited only from an expanded

population which allowed the individual sufficient free time to perform such nonfood-producing and not immediately rewarding activities. These enormous cooperative tasks in which several thousand people must have participated were possibly motivated by religious zeal and by the desire on the part of the rising priestly class to keep the growing population occupied.

At the end of the period theocracy, with all its complexities, was in full swing and was a suitable matrix for the reception of diffused traits. The priestly representatives of this complex and incipient urban culture ceased to look inward upon their own community but instead gazed beyond their boundaries seeking new ideas and problem solutions from other cultures. The growing complexity of this theocratic and urban culture was equipped for and most receptive to outside influences. Thus the tight, inwardly turned, or "vertical cultural" interest characteristic of folk cultures became loosely knit, horizontal, and cosmopolitan, a sign of urbanization in the making.

3. *The Early Classic Period or the Rise of the Theocratic City States* (A.D. *200 to 600*). The archaeological phases associated with this period are: Aurora, Esperanza (Valley of Guatemala); Terrenos Bajos (Almolonga Valley); Chukumuk 2 (Lake Atitlan); Chama 1B-2 (Chixoy drainage, west); Atzan (Zaculeu); Balam (Zacualpa); Lato (middle Motagua); and San Francisco (Pacific coast).

Some time close to the beginning of this period new religious concepts emanating probably from Teotihuacan, Mexico, spread throughout Middle America and were felt everywhere with varying degrees of intensity. In the Southern Maya area they soon became fashionable with the cosmopolitan upper classes and many of the new religious abstractions and innovations were readily incorporated into the philosophy of the Maya urban theocrats. These ideas were most probably carried by itinerant merchants who dispersed them along with trade goods.

Some of these luxury and ceremonial objects were not only traded but were imitated locally, and they were probably used exclusively by the upper classes, since none of these objects have been found outside of the ceremonial precincts. Rimhead vessels and 3-pronged incense burners disappear completely from the archaeological picture. This suggests that they may have been considered rustic and "old fashioned" and were probably discarded by all but the most conservative members of the society. They were replaced by new types of incense burners characterized by a protruding "loop nose," many of which represented double headed feline or reptilian monsters while others depicted the Mexican rain god, Tlaloc (de Borhegyi 1951*b*, 1951*d*). Figurines and effigy whistles are also lacking in the material excavated from the ceremonial and urban centers, but the Teotihuacan type of elaborately stuccoed and painted cylindrical tripod vases with apron covers, the "thin orange" ware bowls, small cult vessels shaped like cream pitchers, and "candle-holders" are relatively abundant among the rich burial offerings.

Utilitarian pottery and household utensils remained much the same. This would suggest that the radical changes were brought through new ideas rather than a migration of people (Kidder, Jennings, and Shook 1946). Unfortunately, the great wealth of archaeological material from this period comes almost exclusively from the excavation of the large ceremonial and urban centers. Figurines, effigy whistles, and 3-pronged incense burners may still have been made and used during this period by the farmers and food producers but in that case they would be found only in the less conspicuous house mounds. To date, however, little attention has been devoted by archaeologists working in the area to these humble and not easily found dwellings.

The settlement pattern of the Early Classic period shows a tendency toward the establishment of more centralized locations and closely knit court assemblages for ceremonial observances and ritual ball games. These ball courts were open at both ends and were built with sloping side walls. The earthen mounds of this period were frequently faced with volcanic pumice blocks set in adobe, were sometimes faced with white plaster, and occasionally contained as many as 8 superimposed structures. Narrow stairways led to the summits of these mounds where stood shrines or altars of perishable materials. Within these mounds the deep burial chambers were roofed with logs and lined with mats, and were filled with rich offerings and sacrificed retainers. Judging from the large number of these burial mounds the society of this period might be labeled "grave-oriented."

Pilgrims who came to offer their devotions to the images of the gods or who gathered in the ceremonial centers for burial rites and feast days were also probably pressed by the priestly class to contribute to the building of new shrines and temples. Thus there was a constant supply of free laborers from the ranks of devotees. The populace living in modest thatched dwellings in the outlying areas must have devoted much of their time and energies to the repair and construction of the large and ornate buildings in the ceremonial centers.

The plazas within the ceremonial centers must also have been the scene of regular market gatherings. Although there is no decisive evidence of the existence of a form of currency at this time, some standardized medium of exchange may have been devised to facilitate the many and varied trading and marketing activities.

The social system that best fits a culture of such complexity must have possessed a reasonably complex stratification consisting of commoners, kin-group heads, warriors, political officials, bureaucrats, clerks, artisans, merchants, and, on the top of the ladder to coordinate all of them, a priestly ruling class. The existence of a slave element recruited from war prisoners is doubtful but possible. All these classes were governed by the economy and the rules of the religious center and every individual no matter how humble was affected by the way of life. All this seems to indicate that within the orbit of the ceremonial center the face-to-face individualistic and personal relationship between man and the supernatural was changed into a complex of abstract, formalized theories and astronomical and mathematical calculations. This esoteric knowledge, however, was not shared by every member of the community. Such advanced concepts could not have been understood or appreciated by the simple farmers who undoubtedly felt much closer to the spirits of the earth and nature than to a far removed and abstract heavenly pantheon. I believe, therefore, that the reason the Early Classic period gives such an appearance of uniformity is due to the cosmopolitan pattern and horizontal world view of the governing upper classes; not because every member of each community understood or contributed to its cultural complexities. Perhaps the picture would be considerably different had more of the outlying and smaller village units or house mounds been excavated.

4. *The Late Classic Period or the Culmination of the Theocratic City States* (A.D. *600 to 1000*). The archaeological phases associated with this period are: Amatle, Pamplona (Valley of Guatemala); Pompeya, Portal (Almolonga Valley); Chama 3-4, Chipal 1 (Chixoy drainage, west); Chipok, Seacal (Chixoy drainage, east); Chinaq (Zaculeu); Pokom (Zacualpa); Magdalena (Middle Motagua); and San Juan, Tiquisate (Pacific coast).

For a while, at least, this period seems to have followed the cultural trends established during the Early Classic. If anything, the culture became more complex and the religion more abstract and formalized. The foreign influences from Teotihuacan were fully absorbed and integrated. Regional division of labor must have been quite extensive because some areas show craft centers where one type of pottery or artifact was made to the exclusion of others. In order that these regional products could be traded from one area to another, organized transportation and the building of road networks became important. As trade increased the highly-prized self-sufficiency of the village units was gradually sacrificed and the villagers became dependent upon many imported goods which were no longer luxury objects but vital necessities in the changed village life. Obsidian from the highlands proved to be superior to chert, the material previously used for spearheads in the rain forest region. Volcanic stone was better adapted to grinding corn than anything available in the limestone country. Prior to this time corn had been prepared in different ways in the lowlands but with the introduction of new eating habits metates and manos became vital necessities and were brought to many regions from the highlands. Shell objects were traded from the Atlantic and the Pacific to satisfy the magical and esthetic desires of folk and upper classes alike. Such large scale activities must have been the result of a greatly increased population. The growth of the population during this period may have been due to more highly organized agricultural activities, accurately regulated by calendric calculations, or to such new inventions as irrigation and agricultural terracing (Armillas 1948: 106-7; Ricketson and Ricketson 1937: 2-12).

Toward the end of the period in the volcanic highlands, building activities seem to have slowed down and the large burial mounds were replaced by low platform mounds arranged around small plazas and rectangular ball courts. By this time the ball courts were closed at both ends.

The settlements, although smaller, were still in open country close to arable land, but seem to outnumber the sites of the previous periods. A reorientation of the cultural goals also seems obvious from the changed cultural inventories. The previously fashionable and ornate Teotihuacanoid ceremonial vessels disappear from the archaeological scene and in their place are found again the familiar ritual objects of the folk cult. Figurines, effigy whistles, rimhead vessels, 3-pronged incense burners, and spiked incense burners all came back into popular usage although, as would be suspected after such a long period, in slightly changed forms. Many of these figurines, effigy whistles, effigy prongs, and rimheads were made in clay molds, a convenient and cheap form of mass production. In this way, even without the knowledge of the potter's wheel, they could be turned out rapidly to meet the needs of a large population. From the foregoing it seems obvious that the folk cult must gradually have regained its original importance in the culture. But at the very end of the period the peaceful scene shows signs of turmoil followed by marked sociopolitical changes. Many of the ceremonial and urban centers located in the rain forest region and in the fertile open valleys of the highlands were abruptly abandoned, never to be repopulated. It is fascinating to speculate on how this abrupt change may have come about and just what reason was behind this drastic mass displacement. Exhaustion of cultural potentialities, disease, economic crises brought on by climatic changes, or the collapse of an unsatisfactory agricultural system have all been postulated as causal factors. Recent evidence however points toward the possibility of a revolt of the food producing classes against the exploitative abuses of the theocrats. This may have come as the result of discontent and loss of faith in the power of the priests and could have been brought on or accelerated by any one of or a combination of the above factors. The revolt seems to have started a chain reaction which spread throughout the Maya area and reached the various ceremonial centers in different years and with greater or less violence. The Bonampak frescoes and the mutilated sculptures and thrones of Piedras Negras in the rain forest region are probable signs of violent revolt, whereas in other areas the evidence points to a more peaceful and gradual readjustment to the old ways (Thompson 1954: 88). The fact that by the end of this period practically all of the great ceremonial and urban centers were abandoned for good, the jealously guarded esoteric knowledge and the hieroglyphic writing of the upper classes were largely forgotten, and the temples were left to crumble and decay, indicates a singular lack of respect for the previous world order.

5. *The Postclassic Period or the Rise of the Militaristic City States* (A.D. *1000 to 1524*). The archaeological phases associated with this period are: Ayampuc, Chinautla (Valley of Guatemala); Primavera, Medina (Almolonga Valley); Chipal 2-3 (Chixoy drainage, west); Samac (Chixoy drainage, east); Quankyak, Xinabahul (Zaculeu); Tohil, Yaqui (Zacualpa); and Chuitinamit (Lake Atitlan).

After the turmoil had died down, Maya society began to reorganize itself. In the rain forest area many groups, like the ancestors of the present day Lacandones, went back to the dim forest regions to continue a peaceful fishing, hunting-gathering, and simple slash-and-burn farming existence with the use of the digging stick. In the security of the dense rain forest they gradually elaborated on their folk ritual. They manufactured, as some of them still do today, effigy incense burners and figurines and approached the spirit world in a personalized form according to their ancestral traditions. Other communities, living in the fertile intermontane valleys of the highlands, moved to the mountain slopes or hilltops where some of them found relative but short-lived security. The wide distribution of the 3-pronged incense burners in these marginal areas tends to confirm this hypothesis (de Borhegyi 1951c: 176, map). They had, however, little time to enjoy their newly regained independence. Several waves of foreign migratory groups entered the Southern Maya area from Mexico. Some probably followed the course of the Usumacinta river while others may have traveled along the Pacific coastal plain. Their legendary leaders claimed Tula (Tollan), the famous Toltec capital, as their original home.

These warlike groups, led by a professional soldiery and equipped with superior weapons such as the bow and arrow, settled down in the highlands of Guatemala and must have been a constant threat to the native population until eventually they had brought most of it under their yoke. However, they were unable to uproot the agricultural, religious, and commercial traditions of their predecessors.

The Mexican groups introduced the cult of the feathered serpent, Quetzalcoatl, named Kukulcan or Gucumatz by the Mayas, and the cult of the war and solar gods, along with "idolatry," a sacrificial cult centering about the worship of temple images foreign to the Mayas. They must have brought an end to the manufacture of 3-pronged incense burners and "rimhead" vessels since none have been found in the excavation of Postclassic sites. The cult connected with the figurines and effigy whistles lived on, however, as it lives today, in modified form. The fashionable censer types of the period became the ladle censers and the crude effigy incense burners made after Mexican (more specifically Mixteca-Puebla) models. Metallurgy, previously unknown in the Southern Maya area, was also introduced during this time although it was never practiced to any great extent (Thompson 1943). The malleable copper and copper alloy tools and weapons were first known only as luxury objects but later became necessities desired by all classes. With the subjugation of the native population, the Mexican groups brought into existence a strong militaristic urban middle class with relatively high living standards which must have depended greatly for survival on the agricultural produce of their Maya subjects.

During the Postclassic period, the settlement pattern had changed from the open land or valley site to easily defended hilltop or fortress sites, many of which were surrounded by deep ravines. Temples and pyramids, occasionally serving as burial mounds, were still constructed but usually as a part of urban concentration. "Twin temples" placed on a single substructure, multichambered, spacious dwellings or "palaces," some supported by massive columns, paved courts, and skillfully constructed drainage systems, suggest a growing emphasis on city living although a good part of the population must have continued its previous farming existence. The formerly sacred ball courts were now built in the shape of the letter "I" and may have been used to a great extent for entertainment whereas the sacred enclosures or plazas became the scene of secular market gatherings. In accordance with urban economy trade and specialization were extensive and widespread. Before long a mobile and prosperous class or guild of merchants and artisans came into being, enjoying the benefits of a concentrated surplus of wealth and social standing.

There are no reasons to believe that the population increased at this time, especially since intertribal warfare became a common feature of the period. The secular aspect of life prevailed over, or at least balanced, the power of the priestly class. Religion became an implement in the hands of the secular rulers and war chiefs who may have used it as the rationale for their expansionistic and imperialistic ventures. There are even reasons to believe that some of the itinerant merchants served as spies and informers for their employers while on business in other areas. Most of the conquests reveal economic rather than religious motives. The tribal aim became the possession of the best agricultural lands, markets, and such industrial regions as the salt and cacao producing Pacific lowlands or the flint and copper abundant regions of the highlands. The intensive warfare, large-scale territorial expansion, and colonization led toward social heterogeneity and away from the homogenous folk-type society. That this way of life was not particularly satisfactory to most of the Maya populace can be seen from the great amount of interregional petty warfare. There was a constant economic struggle between the various Mexican dominated political confederacies (the Quiche, Kakchiquel, Zutugil, Mam, and Pipil) for a monopoly of power and land and for commodities such as the cacao beans, which served not only to provide a luxury drink but also as a socially established form of currency. During these "Dark Ages" one or the other of these competing confederacies gained temporal supremacy or local independence only to be shortly thereafter succeeded by another (Thompson 1943; de Borhegyi 1950*a*). Throughout this period a slow process of "Mayanization" seems to have gone on, together with a growing attachment to the folkways and their associated cults. By the time the Spanish conquerors arrived in Guatemala, most of the Mexican groups were thoroughly "Mayanized,"

their language was to a great extent forgotten, and Kukulcan or Gucumatz was not even a name to be remembered.

6. *The Colonial and Industrial Period* (A.D. *1524 to the present*). With cross and sword the Spaniards introduced to the Mayas an equally abstract and formalized religion, a greatly different economic and political interest, and a complex social structure in which the conquered existed at the lowest level. In spite of constant exposure to these many new ideas, the Maya farmer seems to have been as little affected by them as he was by the pressure of theocracy, or by the Mexican invasions. The strong desire for a direct and individualistic ritual form in which the supernatural could be addressed personally did not abate, and even today it prevails among most of the Guatemalan highland communities. In time they incorporated the cross and made of the saints a form of sacred effigy cult. They amalgamated their old censers with the new ones of the Catholic church and made of the rather impersonal, formalized, and abstract Christian faith a simple family and nature cult that might be labeled "folk catholicism."

The Concept of Folk and Complex Society

The archaeological evidence presented here shows how certain ritual objects and related ideas characteristic of a folk cult persisted through centuries of change and oppression in the Southern Maya area. Although the ceremonial and cult objects themselves underwent certain modifications, the ideology or folk mentality behind them remained practically unchanged (Fig. 108). The conceptual interpretation of the archaeological data argues for a long-lived coexistence of folk and complex cultures in the Southern Maya area with different and frequently opposing world views and mentalities. Not only did each subculture maintain its individuality but over a span of at least 2 millennia it had little, if any, influence on the socioreligious structure of the other. This fact indicates that certain recurring regularities in human behavior can be traced through archaeological data and also calls for a revision of some of the concepts concerning so-called folk cultures, a subject much debated in the literature to date.

According to Redfield's (1947) ideal conception, folk societies are small, isolated, nearly self-sufficient homogeneous groups where a face-to-face personal relationship is preferred, the family or kin group plays an important social role, behavior is traditional and uncritical, and the sacred prevails over the secular. However, the archaeological evidence from the Southern Maya area suggests that folk societies are not necessarily isolated or even small. During the early Formative each folk society was an isolated and self-contained unit, but in later periods it formed a vital part of the total culture and existed in a symbiotic relationship with the more complex urban component. If Termer's calculations are correct (1951: 106), the folk component in the Southern Maya area made up at least 75% of the total populations. He estimates a minimum of 300,000 people as the total population of the area, a density of 6.6 per square kilometer. Of this number it is assumed that only about 75,000 people were connected with the religious cults. According to Redfield (1941: 343), "When folk societies undergo contact and communication with urbanized society, they tend to change in the direction of the opposite of these characters (i.e. the cluster of elements characteristic of folk societies)." The archaeological evidence shows that, in spite of the long and close contact with urbanized society, folk cultures tend to retain their distinct character and resist change toward the opposite direction. Foster (1953: 163), recognizing the inherent limitations of Redfield's hypothesis, describes folk society as a

> . . . "half society," a part of a larger social unit (usually a nation) which is vertically and horizontally structured. The folk component of this unit bears a symbiotic spatial-temporal relationship to the more complex component, which is formed by the upper classes of the pre-industrial urban center. In this sense folk and urban are not polar concepts; rather they are both integral parts of the definition of a certain type of socio-cultural unit in which the pre-industrial city is a focal point. Far from threatening the folk society, this type of urban unit is a precondition for its existence.

According to Steward (1950: 111), "Folk societies and cultures do not entirely disappear but they are modified and acquire new characteristics because of their functional dependence upon a new and larger system."

The definitions of Foster and Steward more closely approach the archaeological picture in the Southern Maya area because both make use of historical depth, a concept greatly lack-

ing in Redfield's "ideal type" of folk society. Foster, after carefully distinguishing between *folk culture* and *folk society*, postulates the 2 stages of development of a folk society as the *pre-industrial*, which appeared with the urban revolution, and the *postindustrial*. He assumes that in the later stages folk cultures disappear according to the degree of industrialization. He does state, however, that "in Latin America large segments of the urban population are more typically folk than anything else." Oscar Lewis (1952) found that Tepozteco families living in Mexico City continued their "folk-like existence" to a surprising degree. Neither Foster nor Lewis have tried to analyze or give reasons for this persistence of "folk qualities," however, nor have they attempted to explain why this "folk ideology" tends to perpetuate itself in the face of strong outside influences. Tax (1941: 29) on the other hand has offered an explanation for this phenomenon. In his description of highland communities in Guatemala he states that the Indians of a municipio "think of themselves as a distinct group of people, biologically and socially." Each group has a relatively exclusive local set of customs and practices. Each municipio has its own economic and social values, its own saints, own fiestas, and standard of living. In spite of the continuous intercommunication, trade relations, and even intermarriage, among the municipios and the realization and acceptance of the fact that different customs and beliefs exist among other groups, they still feel indifferent to them and tend to perpetuate their own sets of beliefs. A medicine or an herb which is good for the neighboring group will not necessarily be accepted in the home community. Tax explains this indifference to the cultural values of other people by attributing it to "the impersonal character of all kinds of social relations." The impersonal character of social relations, according to Tax, "is a form of isolation that restricts communication and borrowing." Because the impersonal type of trade or commercial relationship is generally accepted as a characteristic ascribed to complex cultures he concludes that "a civilized type of social relationship does not necessarily develop together with a civilized type of world view." This picture closely coin-

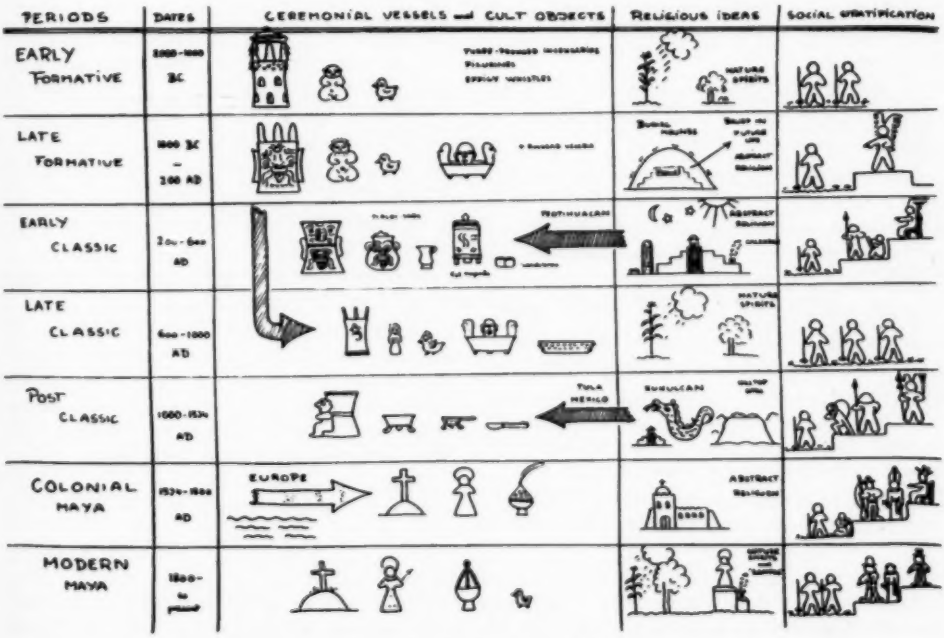

FIG. 108. Schematic representation of cultural changes in the southern Maya area.

cides with the archaeological evidence. The "folk mentality" centering about the agricultural and life cycle, and interwoven with a preferred "face-to-face" relationship with the supernatural, at least in the Southern Maya area, has remained virtually unchanged from the Village Formative period up to the present. It was not greatly affected by the urbanization process nor by the process of general secularization during the Militaristic or Postclassic epoch. While money economy (if cacao beans were really such) and a widespread system of organized trade was well received by most members of the folk culture by virtue of their impersonal nature they left unchanged the basic folk mentality. Tax's conclusions are of considerable importance in the understanding of the folk mentality of the Guatemalan highland communities. He leaves unexplained, however, the basic causal factors for their conservatism. Through an analysis of the integrated goal and value structure of both folk and complex cultures we may better understand why the former tend to perpetuate themselves and the latter are subject to constant change.

In the following list I have presented certain general observations and concepts concerning folk and complex cultures. These observations are based primarily on the conceptual interpretation of the archaeological data in an attempt to discover universal regularities in human behavior. It is to be expected that some of these statements are repetitions of earlier observations made by Redfield (1940, 1941, 1947), Steward (1950), King (1953), and Foster (1953). On the whole, however, I believe this much debated subject will profit by the addition of historical perspective.

Folk Culture

Definition

Generally organized around the local food supply, local institutions, and simple or complex associations with nature. It develops in dispersed self-contained settlements or on the outskirts of urban and/or ceremonial centers.

Characteristics

1. Basically homogeneous, more static than flexible, is usually self-directed and tends to be ethnocentric and perpetuative in its world view.

2. Depends mostly on a self-produced food supply to support its members and the few part-time specialists.

3. Basically realistic, regional, and nationalistic in its philosophy and artistic expression.

4. Prefers a personal "face-to-face" individualistic approach and control of things and the supernatural.

5. Offers few cultural facets and few alternatives, thereby giving a feeling of optimum security to the individual.

6. Prefers a commonly shared, stable way of life with a deeply integrated goal and value system which is ultimately satisfying and rewarding for the individual.

7. Basically nonaggressive and noncompetitive, usually resists new ideas passively, but may rise in violence when threatened by total destruction.

8. Less inventive and less susceptible to cultural influences. Regards them with an implicit suspicion as potential dangers to its group unity, stable goal and value structure, and system of group security.

Complex Culture

Definition

Generally organized around sacred or secular associations, organized trade, money economy, and politico-religious administration. It develops in ceremonial, urban, and/or industrial centers.

Characteristics

1. Basically heterogeneous and dynamic, is usually government directed, and tends to be cosmopolitan and flexible in its world view.

2. Depends mostly on an outside or artificial food supply to support the great number of non-food-producing specialists.

3. Basically abstract, formalized, and cosmopolitan in its philosophy and artistic expression.

4. Prefers an impersonal group approach and control of things and the supernatural.

5. Offers many cultural facets and alternatives, only a few of which can be realized, thereby causing frustration and insecurity for the individual.

6. Prefers a flexible way of life with multiple choices of goals and values which leaves the individual unsatisfied, unrewarded, and seeking satisfaction.

7. Basically aggressive and competitive, seeks new ideas constantly and attempts to disseminate them, if necessary by forceful methods.

8. Inventive and eager to accept cultural influences. Regards them as possible problem solutions, through which the uprooted group unity, stable goal and value structure, and stable system of group security might be regained.

These observations may be summarized as follows: Folk cultures, whether past or present, can exist independently or as distinct subcultures within a more complex cultural unit. They tend to maintain their cultural distinctness because, through the sum total of their satisfying problem solutions, they give the utmost security and reward to their members. As a consequence, they do not readily incorporate new ideas, goals, or values into their cultural structure.

This principle can be applied to many of the present day Maya communities in the Guatemalan highlands. The Maya farmer of today is motivated by an implicit desire for group security in his dealings with other individuals and his philosophy of living. He is generally noninventive, noncompetitive, nonaggressive, and tends to look with suspicion on modern technology and innovations introduced to him by his government or by international agencies. He has made of the abstract and formalized Catholic religion a simple family or kin-group cult through which he approaches the supernatural directly and personally. He prefers the stable way of life that gives him maximum security because of its minimum number of alternatives. As a result he is frequently regarded as backward and stubborn. Time and again anthropologists are asked to explain why the Maya Indian no longer seems to be capable of producing the "grandiose achievements" for which his ancestors are popularly known. In answer to this query, it has been suggested (La Farge 1940; Beals 1952) that the Indian has suffered greatly from the initial shock of the Conquest and that his "degeneration" (or backwardness) is due in part to the many years of humiliating submission and virtual slavery. The archaeological evidence shows us however that neither the Theocratic period nor the Mexican and Spanish conquests brought about drastic changes in the "folk mentality" of the Maya farmer. He probably understood and appreciated neither the intricate glyphic and calendric system nor the abstract philosophical religion imposed upon him by Maya and Mexican theocrats, or by the Church of Rome. Then, as now, the achievements of the ruling upper classes seem to be mere incidents in the life of the Maya farmer. How the increasing pressure of industrialization, scientific farming, and politics on a nation-wide scheme will affect these folk cultures cannot yet be judged in proper perspective.

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UNIVERSITY OF OKLAHOMA MUSEUM
Norman, Okla.
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STRATIGRAPHIC EXCAVATIONS IN THE SAMBAQUI OF ARAUJO II, PARANÁ, BRAZIL

ADAM ORSSICH AND ELFRIEDE STADLER ORSSICH*

LARGE accumulations of shells can be found in flat coastal regions and along the lower course of big rivers all over the world. Many of these shellmounds have been investigated by archaeologists and have been found to contain, besides shells, considerable quantities of ash, numerous artifacts of stone and bone, occasionally potsherds, and often a relatively large number of human skeletons. Their contents and stratification reveal these mounds to be deposits of kitchen refuse, accumulated on prehistoric dwellings sites by tribes whose main source of food was fish and mollusks.

In Brazil such shellmounds can be found not only all along the Atlantic coast and up the Amazon, but even in Mato Grosso, along the banks of the Paraguay River. No systematic survey of Brazilian shellmounds has yet been made. It appears, however, that they are especially frequent along the southern half of the coast of Brazil, where, according to reports, they cluster by hundreds in the swampy alluvial plains near the mouths of rivers. Although they have various local designations, the one most often heard and most frequently employed in the literature is *sambaqui*.

Ever since the conquest these sambaquis have been exploited on a large scale, as their shells are the only source of lime in the coastal regions. Their huge dimensions, which make them very conspicuous on the flat plains, and their content of human skeletons and artifacts have aroused the curiosity of travelers for a long time, but only since the latter part of the 19th century have scientists begun to take interest in the problem. Sporadic attempts have been made to solve the questions of origin, purpose, and significance of these shellmounds. Many sambaquis have been dug into by anthropologists without archaeological training, interested only in the study of the skeletons, by zoologists eager to study the malacological fauna represented, by geologists in search of cues for the dating of Quaternary sea terraces, and unfortunately, by local amateurs and by curio hunters, attracted by the artifacts. No trained archaeologist had ever excavated a Brazilian sambaqui. As a consequence the abundant literature about sambaquis is far from satisfactory, full of unproved hypotheses and conjectures, and offering few reliable observations.

This was the general situation when we started to investigate the sambaquis on the coast of Paraná in 1952, under the auspices of the Instituto de Pesquisas of the University of Paraná in Curitiba. After surveying the area, we picked the sambaqui of Araujo II as the most promising site, both because of its location and because it had not suffered damage from road building or other operations.

The shell midden or sambaqui, Araujo II, is the largest of a group of 3 mounds in the swampy coastal plain of Guaratuba, about 8 km. inland from the present beach line and near the foothills of the Serra do Mar. A detailed examination of this geographical situation suggests that the environment has changed since the site was inhabited. The sambaqui is

* We are particularly indebted to José Loureiro Fernandes, Director of the Instituto de Pesquisas, Faculty of Philosophy, University of Paraná, for organizing this project and for valuable advice based on his long study of sambaquis. Thanks are due to the late Frederico Lange de Morretes of the Museu Paranaense, who spent several days on the site and identified the mollusks. We are likewise indebted to Fernando Corrêa de Azevedo, Director of the Departamento de Cultura do Paraná; Oldemar Blasi, Director of the Patrimônio Histórico, Artístico e Cultural do Paraná; and Arion Dall 'Igna Rodrigues, member of the Instituto de Pesquisas, all of whom assisted us during the entire excavation. Although not archaeologists, their natural inclination and ability and their dedicated collaboration contributed a great deal toward the successful conclusion of the program. No expression of our appreciation for the assistance rendered us by a great many public officials and private citizens seems sufficiently adequate. Their kindness, good will, and helpfulness did much to make it possible to carry on the project.

The material collected was deposited in the Instituto de Pesquisas in Curitiba, where a short preliminary study of the objects was made by the authors. The photographs of the lithic material were made by the technical staff of the Faculty of Philosophy of the University of Paraná. Finally, we wish to acknowledge our heavy debt of gratitude to Clifford Evans and Betty J. Meggers for their aid in preparing this paper for publication, and to the Wenner-gren Foundation for Anthropological Research for making possible the publication of the illustrations.

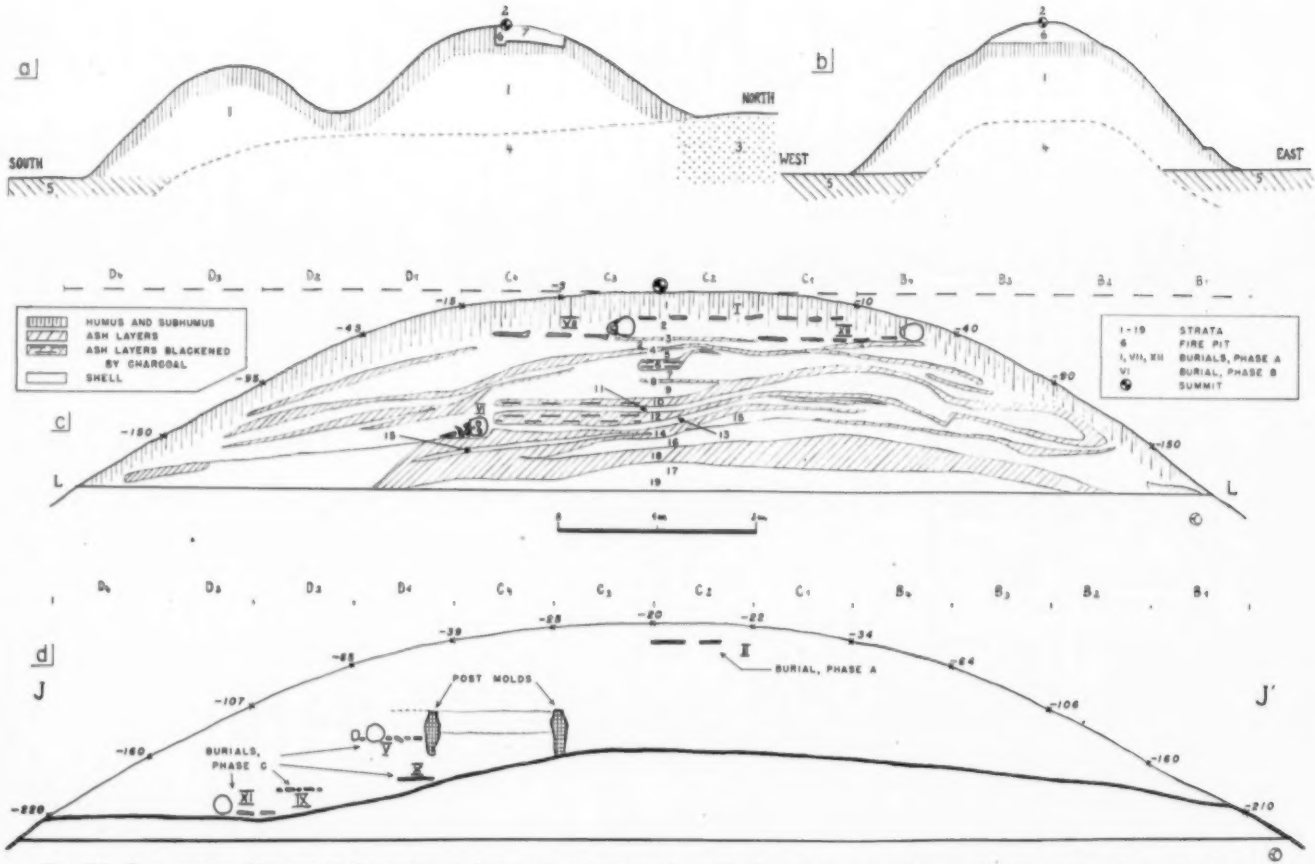

FIG. 109. Cross section diagrams of the sambaqui Araujo II. *a.* north-south profile showing location of excavation (*1*, midden; *2*, summit; *3*, spit of dune; *4*, probable natural foundation of sambaqui; *5*, swampy plain; *6*, initial trench; *7*, excavated sector). *b*, east-west profile (key same as for *a*). *c*, profile of north wall of initial trench, showing stratification. *d*, section J-J' through excavated sector showing position of postmolds and burials (see also Fig. 110).

built on the top of a natural hill, part of a row of dunes that rise 6 m. above the adjacent plain and 8 to 10 m. above sea level. A trench showed these dunes to be composed of sandy, dark brown soil of marine origin, and their position marks an old shore line which once bordered a broad bay.

The swampy plain now lying in front of this old shore line ends at another row of dunes nearer the present shore. These are composed of pure sand of bright color and are considerably lower in elevation, which, together with their closer proximity to the sea, suggests a more recent origin. Sambaquis were numerous here too, but have been or are being destroyed. Observations made on the exposed cross sections showed these sites to be nonceramic, but of more recent origin than Araujo II.

The subsoil of the plain between these 2 lines of dunes consists of pure sand covered by a thick layer of mud. This makes it evident that the sea had once reached as far as the dunes on which Araujo II lies. Later the sea receded and the second line of dunes formed farther out. These closed the bay and transformed it into a lagoon, the shores of which must have offered excellent conditions for a fishing and mussel-gathering population. In the course of time this lagoon silted up, and the sambaquis on its shores ceased to be accessible by canoe. They were then abandoned by their inhabitants, who probably moved to another site nearer their new fishing ground.

The distance separating the sambaqui of Araujo II from the present shore and navigable water and the elevation of its base above sea level suggest considerable antiquity. This sambaqui lies on the tip of a narrow spit of the former shore (Fig. 109 *a, b*), so that three of its sides fall off steeply to the swampy plain, whereas the fourth slopes to the terrace. It is oval, 40 by 60 m., and has 2 flat tops. The higher one rises 15 m. above the plain and 9 m. above the terrace, the lower top 11 m. and 5 m., respectively. Before excavation both the sambaqui and the vicinity were covered by dense vegetation; no traces of recent disturbances were visible, and very few shells could be seen on the surface.

Our first season's field work lasted only 1 month and much of this time had to be spent in the preliminary survey and in clearing the site of vegetation. Following this we dug a horizontal trench 12 m. long and 2 m. deep across the highest point of the bigger top, transverse to the main axis of the sambaqui. After careful study of the strata (Fig. 109 *c*), we started to excavate stratigraphically an adjoining sector 6 to 12 m. wide. In this sector we reached a maximum depth of 1.60 m. below the surface before the excavation was terminated. It was often very difficult to distinguish the limits between the individual layers in this large sector. Particularly at the periphery, the contents of the different strata were fairly uniform and rather loose. As a consequence of this looseness, quantities of ashes sloughed off during excavation obliterating the lines of individual strata, and making the detection of intrusions almost impossible. In future excavations it would be preferable to subdivide the area by a grid system of narrow trenches into convenient rectangles. In these trenches the exact position of the strata, as well as many of the intrusions, would be visible on all 4 sides of a block. The midden refuse could then be removed and sifted layer by layer. This system is necessarily slow, but guarantees maximum accuracy of results with an untrained crew.

Our initial trench showed rather clearly the stratified structure of the midden (Fig. 109 *c*). A layer a few centimeters thick of humus was followed by about 40 cm. of subhumus. In the fresh cut this subhumus seemed to consist of an unstratified mixture of earth, ashes, and shells, traversed by innumerable roots. However, after the profiles had been exposed to rain and wind, it could clearly be seen that the subhumus was also composed of many very thin layers of shells alternating with layers of ash, all impregnated with humus, but only locally disturbed by the intrusion of bigger roots and by animal burrows. Careful study of the profiles revealed that the surface of the sambaqui is the original one, no artificial lowering or removal having taken place since the site was abandoned by its last inhabitants. This fact is rather important in view of the shallowness of the first burials detected. The thinness of these top layers appears to be explained by the advanced silting up of the lagoon and the decreasing productivity of the mussel banks resulting from it.

From the subhumus downward, well-defined layers composed mainly of shells alternated with layers principally composed of ashes. These strata were considerably thicker than those in the subhumus, which suggests that

for a). *c*, profile of north wall of initial trench, showing stratification. *d*, section J-J' through excavated sector showing position of postmolds and burials (see also Fig. 110).

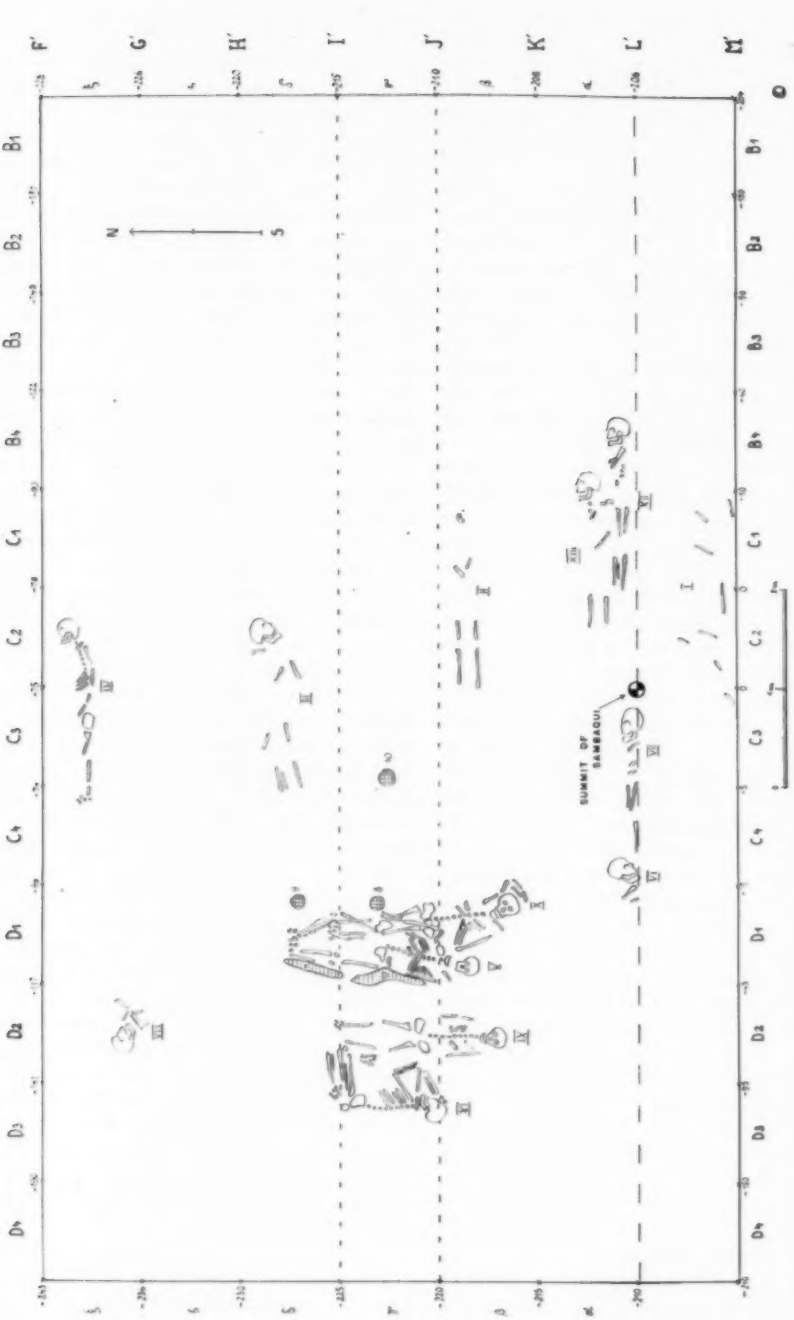

FIG. 110. Plan of excavated area. Initial trench lies between L-M and L'-M'. *6, 7*, agricultural implements (Fig. 114 *d, e*); *8, 9, 10*, postmolds; I to IV, VII, VIII, XI, XIII, burials of Phase A; VI, burial of Phase B; V, IX, XI, burials of Phase C.

either the mussel banks were more productive or the population was more numerous. The thickness of the individual layers was not uniform. They were most nearly level in the central part of the sambaqui, gradually sloping from there outward, with steep inclination only near the outer sides of the mound.

In the shell layers, the predominant species was *Anomalocardia brasiliana* Gmelin, a mollusk that lives in water of low to middle salinity. About 2% were shells of *Ostrea arborea* Chemnitz, and some of *Ostrea arborea praia* Ihering, both of which inhabit mangrove swamps. A few other shells of marine mollusks, fresh-water snails, and shrimps were scattered throughout the layers. Most surprising was the total absence of bones of mammals and birds. Bones of medium sized fish were abundant, some of which were identified by local fishermen as tainha, a species that attains a length of 80 cm. and which occurs during winter in big shoals offshore and in lagoons.

It is noteworthy that about 5% of the shells of *Anomalocardia brasiliana* were closed. Two explanations are generally given for these closed shells, which are found in all sambaquis. Some contend that the shells can close after the mollusk has been extracted provided the closing muscle has not been injured. However, this situation would probably not have occurred frequently enough to account for such a large number of cases. A second widely held opinion is that the closed shells were offerings of plenty in connection with the burials found in all layers. In our excavation we found them fairly evenly distributed in the refuse, with no concentration in the vicinity of the graves. Hence, we cannot accept the second explanation either. We are of the opinion that these closed shells may represent the unconsumed excess of the daily catch.

In the central part of the mound, the ash layers were somewhat more compact than the shell layers and blackened by quantities of charcoal. A scattering of shells was always present, most of them reduced to tiny fragments that sometimes formed pockets or thin strata with nacreous luster. It was possible to identify one species, *Modiolus brasiliensis* Chemnitz, a mytiloid that lives in lagoons with water of rather low salinity. Quantities of bones and scales of medium sized and small fish were also noted in the ash layers. Proceeding from the center to the edges of the deposit, the ashes became looser and less blackened by charcoal, and were mixed with increasing amounts of unbroken shells. Near the periphery of the mound the ash layers contained so many shells and the shell layers so many ashes that it was often impossible to distinguish between them.

Cultural Remains. A total of 817 pieces of stone and 3 bone artifacts were recovered from the excavated area. A few of the celts, axes, and other implements have a well-ground surface and a sharp, polished edge. Some bilaterally chipped hand axes and a number of unilaterally chipped and flaked blades and points were easily identifiable as artifacts. In all layers investigated, however, the overwhelming majority of the stones had the superficial appearance of incidental fragments of diorite, diabase, basalt, gneiss, sandstone, quartz, and quartzite. Nevertheless we decided to collect these rude pieces too, considering that they certainly were brought to the sambaqui from some distance away, no stones of any kind being present in the subsoil for at least 2 km. around the site. It soon became evident that this crude material included several typical shapes. We were able to seperate series of blades, points, drills, gravers, scrapers, grinders, and polishing stones, most of them very crudely formed, but some with distinct traces of wear by use. Only about 20% of the stones could not be assigned to any of these types. They probably were unworked flakes or fragments of broken implements.

No potsherds were found either on the surface of the sambaqui or in the layers investigated, nor were there clay accumulations to suggest that unbaked clay vessels might have been used.

During the excavation we encountered 13 graves (Fig. 110 *I-XIII*) and found traces of two more which were not examined as they lay outside the excavated area (Orssich Stadler 1954: 71). Each grave contained a single individual, with the skeletal remains in a fragmentary state of preservation. Except in Graves I and VIII, which had been totally destroyed by the intrusion of big roots and by burrows, none were disturbed. The position and orientation of the skeletons were uniform in each cultural phase, but changed when a new phase was reached. All grave pits were very shallow with the skull sometimes covered by only 5 cm. of overburden. In one case only (Grave VI) the pit was 40 cm. deep. All graves were filled

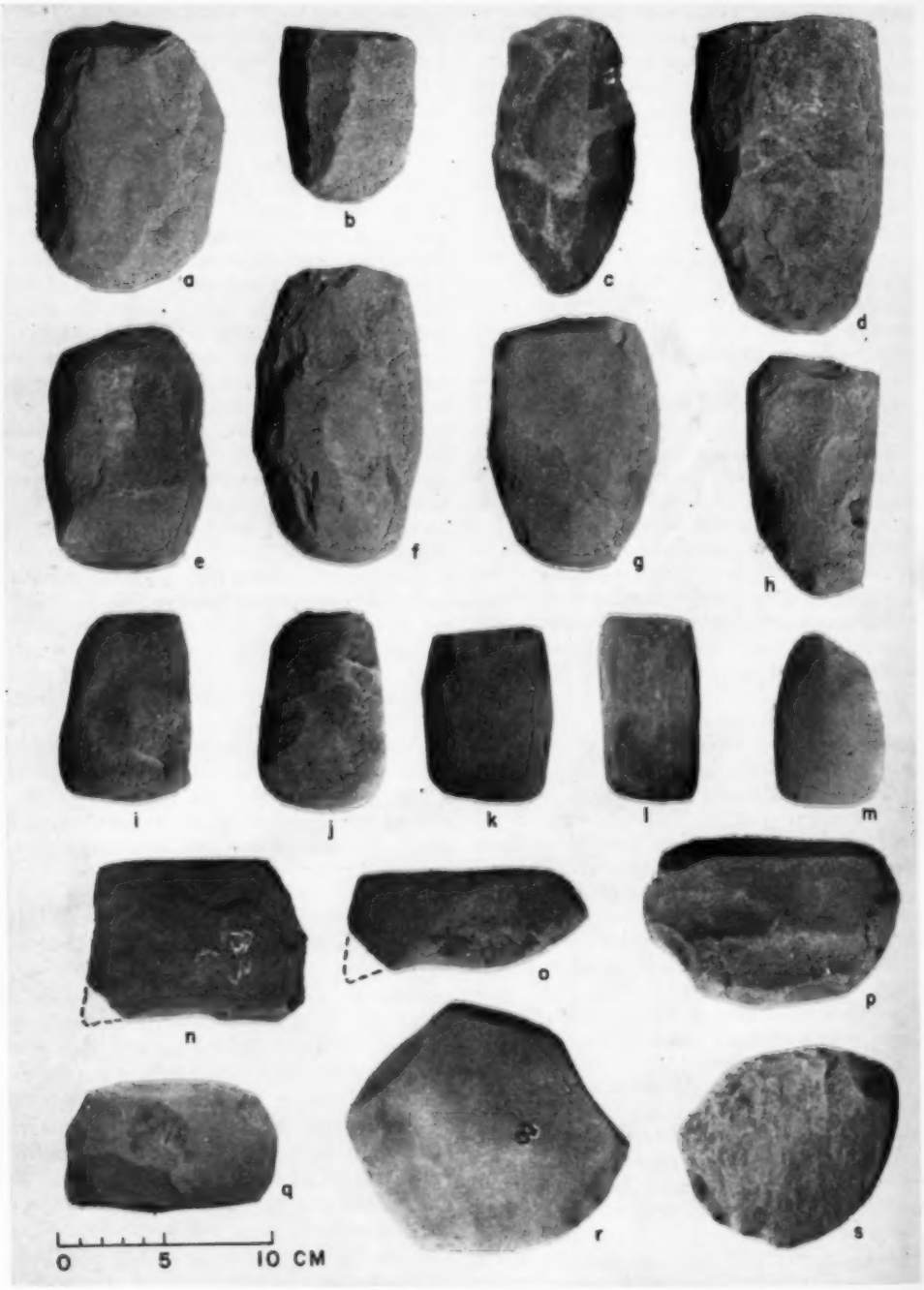

FIG. 111. Artifacts of Phase A. *a-h*, axes; *i-o*, celts; *p-s*, adzes.

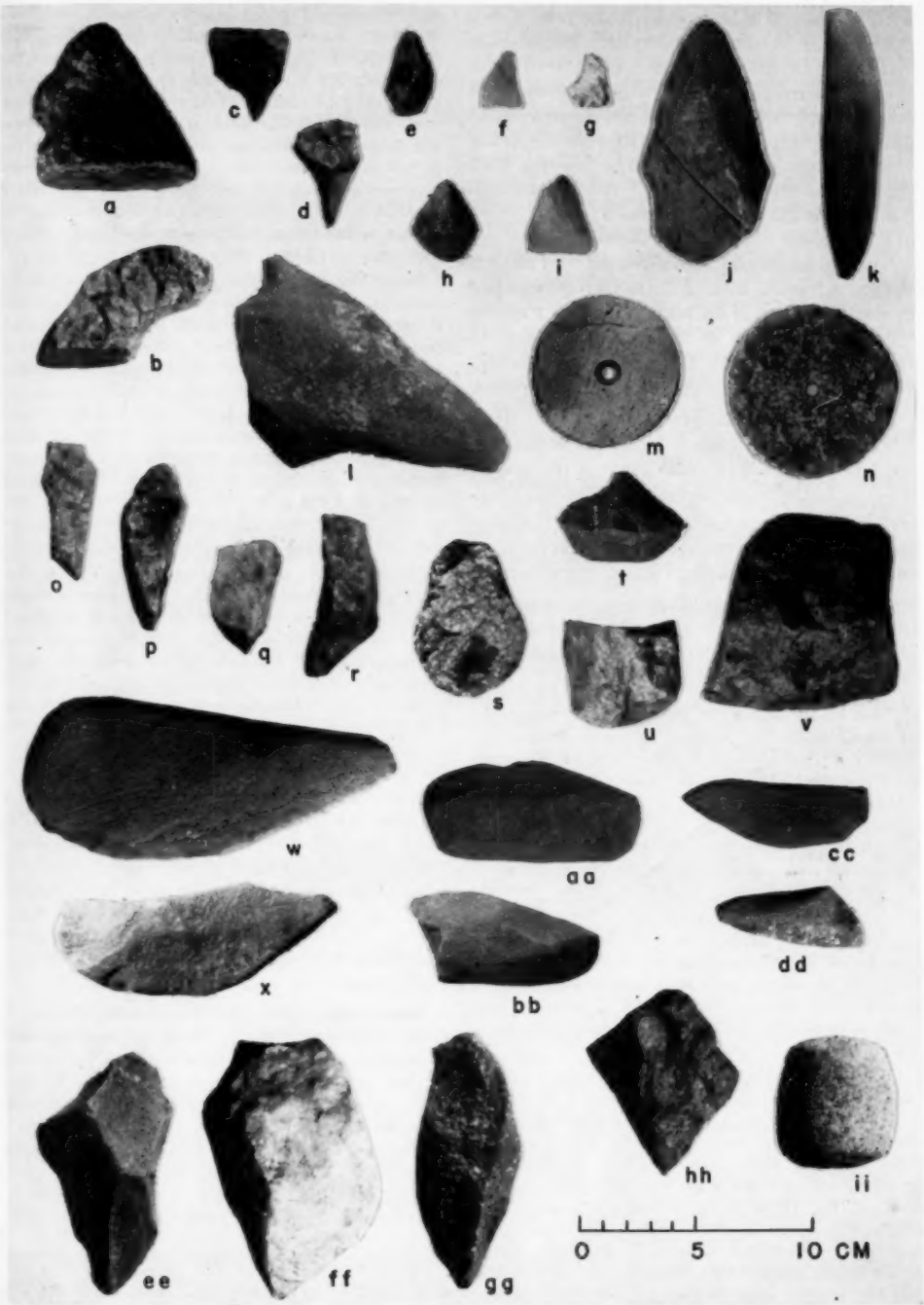

FIG. 112. Artifacts of Phase A. *a*, *b*, abraders; *c*, *d*, drills; *e-j*, projectile points; *k*, sinker(?); *l*, triangular implement; *m*, *n*, discs; *o-r*, gravers; *s-v*, scrapers; *w*, *x*, choppers; *aa-dd*, knives; *ee-hh*, picks; *ii*, hammerstone.

with shells and ashes, which were mixed in a different proportion than in the neighboring layers and contained a small quantity of red-colored earth. Sometimes this color was discernible only after the ashes had been washed away by a rain. This red earth does not occur near the sambaqui, but had to be brought from the distant mountain range. All graves contained some lithic funerary offerings, but the list of grave goods shows no fixed pattern.

Three distinct and successive cultural phases, designated as A, B, and C, were distinguished in the numerous shell and ash layers forming the upper 1.60 m. of the higher summit of Araujo II. The artifacts and the position and orientation of the burials differ in each phase.

Cultural Phase A. The upper 8 strata (Fig. 109 *c*) belong to Phase A. This phase is charterized by east to west orientation of the graves, lateral position of the skeletons, bilaterally chipped hand axes, and unilaterally flaked implements. The stone and bone tools represent a variety of types and technics of manufacture.

Burials. The 8 skeletons belonging to this phase (Fig. 110 *I-IV, VII, VIII, XII, XIII*) lay in extended lateral position in very shallow grave pits. (Graves I and VIII were destroyed by roots and burrows, but it seems probable that they had the same orientation.) The skull of Skeleton III lay only 5 cm. beneath the surface of the sambaqui. Skulls and bones of all skeletons were very brittle and crushed beyond repair, and all the teeth were worn to the roots. All graves contained a few funerary offerings (implements of stone, perforated discs of stone and bone, pieces of iron ore or of ocher). The artifacts in the graves were the same as those in the surrounding refuse, indicating that the burials contained the skeletons of the last inhabitants of the sambaqui and were not later intrusions.

Adzes. Several crudely worked adzes were found, none with a ground edge. Some are unilaterally chipped (Fig. 111 *p*), others have their surface smoothed by pecking (Fig. 111 *q*). Some discoidal adzes of very rough workmanship are bifacially worked producing a semicircular flaked edge, with a pointed (Fig. 111 *s*), or a trapezoidal (Fig. 111 *r*) butt.

Axes. The hand axes are either chipped all around (Fig. 111 *b-d*), or are a natural cobblestone that was adapted by chipping and pecking (Fig. 111 *a, e-h*), in which case part of the natural surface has been preserved. Sometimes the edge has been sharpened by grinding (Fig. 111 *d-g*). It is noteworthy that these ground edges, seen in end view, are always arched, a peculiarity never found in celts of this level, which always have a straight edge. Many hand axes have the butt end cut off, apparently on purpose (Fig. 111 *a-b, d, g-h*). Such cut-off butt ends are quite frequent in some Southeast Asiatic hand ax cultures, notably the Keophay culture of Annam and Tonking (Colani 1929: 353), a culture in which mollusks also constituted one of the principle sources of food. One hand ax (Fig. 111 *g*) has the butt end cut off at an oblique angle to the main axis and well ground, indicating that this form was intentional. Another with chipped and partially pecked surface has a very unusual form (Fig. 111 *h*), its rather short, curved, and well-ground edge forming an oblique angle to the main axis. Although referred to here as hand axes, it is possible that some, or all, of these tools may have been hafted.

Celts. The celts of this phase (Fig. 111 *i-o*) have a trapezoidal, rectangular, trianguloid, or ovoid shape, and a circular, oval, almond-shaped, trianguloid, or quadrangular cross section. Their surfaces are either well ground or only slightly pecked. In contrast to the hand axes, the blade is always straight in end view. In most of the celts the sharpened edge extends 1 to 3 cm. up the side. Some have their butt end worked off at an oblique angle to the main axis (Fig. 111 *i, k-l*). A celt with a quadrangular cross section (Fig. 111 *n*) and a flat ax with a triangular cross section (Fig. 111 *o*) seem to have had a projection running out from where the front edge and the lower side meet.

Choppers. Two unusually formed implements seem to have been a kind of chopper. One is very carefully worked and has a well-smoothed surface (Fig. 112 *w*). The back is straight and thick. The cutting edge comprises half of the curved side, the remainder tapers towards the butt. Only the long cutting edge is worn by use, showing that this tool was used for chopping. The surface of the other chopper (Fig. 112 *x*) is only slightly pecked so that traces of the original percussion flaking can still be seen.

Discs. Three circular, flat, centrally perforated discs were found in graves of this cultural level. One is of white stone (Fig. 112 *m*), with a conical perforation. The other two are made of the tympanic bone of a whale (compare Tiburtius, Leprevost, and Bigarella 1949), one of which has small decorative notches on one face (Fig. 112 *n*). It was found in Grave III in front of the skull, only a few centimeters from the forehead, suggesting use as a forehead ornament.

Hammerstones. The many cobblestones, some of them of considerable size, probably served as hammers or grinders. On many of them traces of battering or grinding can be detected on one or both ends. One cobble of gneiss is worked by pecking and grinding to a symmetrically cylindrical form (Fig. 112 *ii*). Both ends are flattened and show traces of wear by use. A group of flat, oblong cobblestones with half their length broken or flaked away are reminiscent of the numerous crude chopping tools found in Chilean middens (Bird 1943, Fig. 17).

Knives. The percussion flake knives have their surfaces smoothed by grinding and have a sharp (Fig. 112 *cc-dd*) or a rounded tip (Fig. 112 *aa, bb*).

Labret. Another artifact of bone, cut and well polished, seems to be a lip plug (*tembetá*). A number of identically shaped objects found in other sambaquis are in the museums of Curitiba and São Paulo.

Picks. Some large points of basalt (Fig. 112 *ee*) are unilaterally percussion flaked from thick slabs. There are numerous similar tools of quartzite, quartz, and gneiss, which also have an expanding triangular cross section (Fig. 112 *ff-hh*). There are also a great many smaller points or picks, 2 to 5 cm. in length, which have a similar expanding triangular cross section.

Projectile points. Projectile points are rare (Fig. 112 *e-j*). A large example (Fig. 112 *j*), 11.5 cm. long, has a unilaterally flaked blade and a broad rounded stem. Among the crudely fashioned, small points, there is one of clear quartz that has bilaterally retouched edges and is asymmetrically barbed (Fig. 112 *f*).

Sinker(?). A 12 cm.-long, cigar-shaped stone object (Fig. 112 *k*) seems to be a fishing line sinker. The cross section is nearly circular, except for a flattening on one edge. There is no groove at the tip, but sinkers without grooves have been found in Chilean middens (Bird 1943: 209).

Sling stones. The numerous small pebbles found in the refuse may have been used in slings.

Triangular Implement. A unique implement is an irregularly triangular stone (Fig. 112 *l*). The thick short side, which seems to have been the butt, shows pecked out cavities that probably served for hafting. The other edges are sharpened. When hafted, the shorter of the long sides must have protruded at a right angle from the shaft, while the longer one slanted downwards. The profile of this implement, as also its probable position when hafted, shows a remarkable similarity to the so-called "halberds" of European and Asiatic prehistoric cultures, which always were hafted at a downward slanting angle. Most of these halberds are of copper or bronze, but the earliest known types, found in Portugal and in southeast Spain at Malaga and at Los Millares, are of flint (Lechler 1938: 39).

Miscellaneous. Some drills (Fig. 112 *c-d*), a great many scrapers of different types (Fig. 112 *s-v*), gravers (Fig. 112 *o-r*), and some well-used abrading stones (Fig. 112 *a-b*) came from Phase A.

Cultural Phase B. This phase, represented in stratigraphic layers 9 and 10 (Fig. 109 *c*), is characterized by the occurrence of very well-fashioned and carefully ground celts and axes. The only burial discovered (Fig. 110 *VI*) was nearly destroyed before it was noticed, owing to the inexperience of the crew. However, the position of the skull and the clavicles, which had remained undisturbed in the profile of the initial trench, suggested a northeast to southwest orientation of the grave. In contrast to all the other skeletons this one had only slightly worn teeth.

All the celts and axes from the these 2 layers have a trianguloid cross section (Fig. 113 *a-d*). Like those from the earlier and later cultural phases, the blade continues partly along the side of the bit. One very long celt (Fig. 113 *d*) tapers slightly towards its butt end. A rather large flat ax (Fig. 113 *a*) has its butt end ground at an oblique angle to the main axis. One implement (Fig. 113 *e*) seems to be a chopper of the type also present in phases A (Fig. 112 *w-x*) and C (Fig. 114 *a*).

The thinness of the layers 9 and 10 and the disturbance from the intrusion of numerous roots made it difficult to assign many objects with absolute certainty to these strata. Those of unquestionable provenience, however, show a technical skill and a sense of form that surpass by far the stone tools from Phases A and C.

Cultural Phase C. This phase is represented in the layers from 11 downward (Fig. 109 *c*) as far as they were investigated. The characteristic features are the south to north orientation of the burials, and the total absence in the lithic inventory of hand axes and of unilaterally chipped tools.

Burials. Three of the 4 skeletons found (Fig. 110 *V, IX, X*) lay in extended dorsal position, one (X) with the right hand over the head and the left flexed over the chest. The fourth skeleton (XI) lay on its right side, with both legs bent and folded at a right angle to the spine, the right hand under the cheek, and the left supporting the right elbow. Between the knees and the right elbow lay unidentifiable splinters and decomposed remnants of small bones of what may have been the skeleton of a small child. Skeleton XI lay 25 cm. deeper than skeleton IX (Fig. 109 *d*) and, since its position differs from that of the other skeletons and it was found in the closing stage of our operations, it seems possible that it does not belong to Phase C but to an as yet unidentified earlier cultural phase. All skulls and bones were badly broken and friable, and all teeth worn to the roots.

Agricultural Implements. In Grave V, 3 implements were found which may suggest the practice of some kind of rudimentary agriculture, possibly that of manioc. One is a big pestle, 56 cm. long (Fig. 114 *e*), of a type frequently found in Brazilian sambaquis. The second is a curiously formed flaked stone (Fig. 114 *d*), 75 cm. long, with triangular cross section, one side of which is absolutely flat. One extremity of this implement tapers to a point, while the other seems to form a long curved handle. One of the edges bordering the flat side is symmetrically curved from end to end, while the opposite edge is somewhat concave. On sites of already destroyed sambaquis of this region, and in the private

collection of Guilherme Tiburtius in Curitiba, we have seen a number of stones of identical form, some of them even bigger and heavier than this one. Their weight and the presence of what appears to be a handle suggest that they were used for crushing some tuber, possibly manioc. The third has a broad blade and a pointed butt (Fig. 114 *c*). In profile it tapers toward the slightly downward curved, badly worn bit which is ground on both surfaces. The sides are flaked. Although aboriginally the hoe was not common in South America, possibly this implement could have served for tilling.

Celts. The few celts found (Fig. 114 *m*, *n*) have their surface only partially ground. The cross section is trianguloid and the blade extends part way along the lower sides.

Chopper. The funerary inventory of Grave IX included a chopper (Fig. 114 *a*), which seems to be a very primitive type of the series described under Phase A. It is bilaterally chipped, and has a rounded, badly worn bit.

Disc. A flat stone disc with a central perforation was associated with Skeleton V (Fig. 114 *f*).

Miscellaneous. The implements of quartz and quartzite found in these layers are even less carefully fashioned than those from the other cultural phases. We found a few arrowpoints with convex bases (Fig. 114 *g*), many thick picks with expanding triangular cross sections (Fig. 114 *h-l*), and several scrapers (Fig. 114 *o*), plus a considerable number of unidentifiable stone fragments.

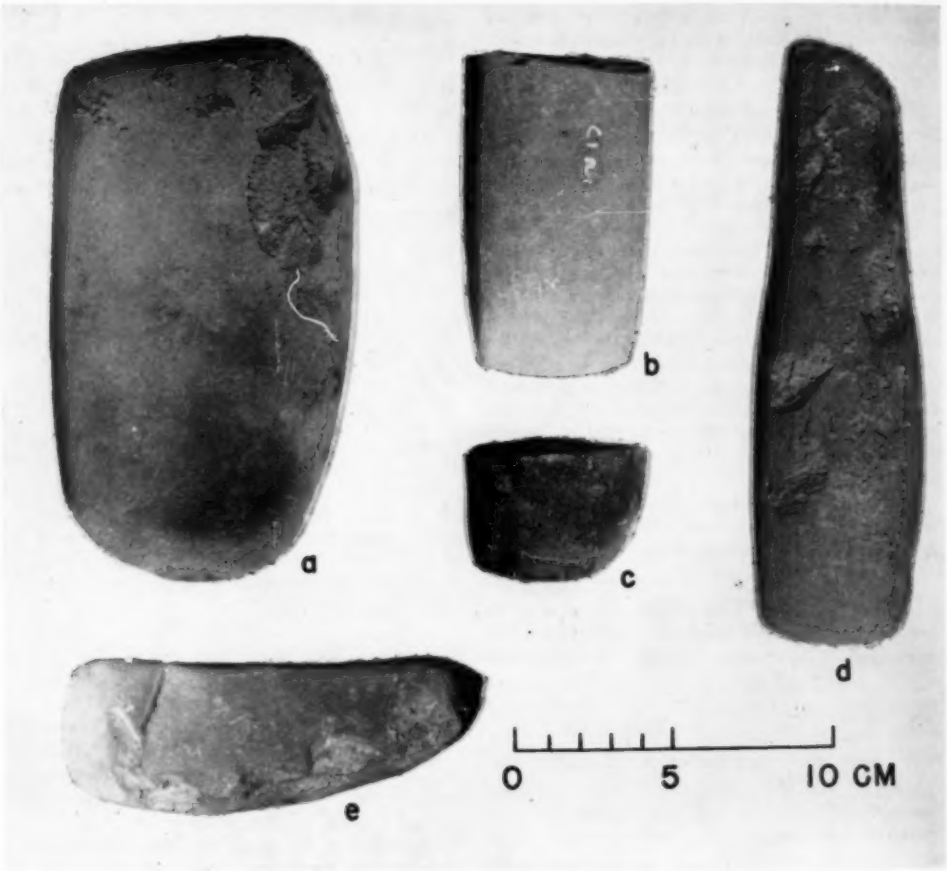

FIG. 113. Artifacts of Phase B. *a-c*, axes; *d*, celt; *e*, chopper.

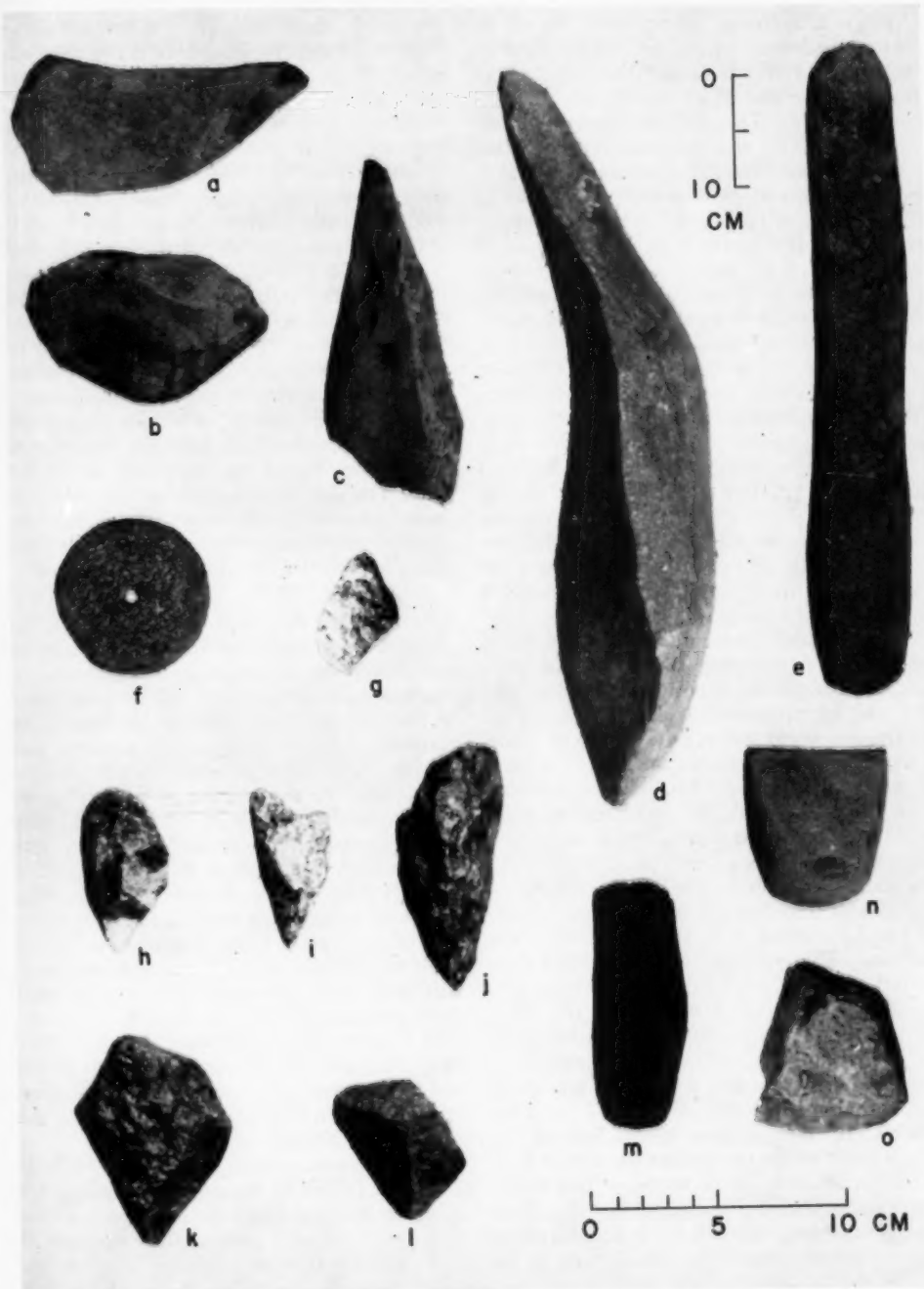

FIG. 114. Artifacts of Phase C. *a*, *b*, choppers; *c-e*, agricultural implements; *f*, disc; *g*, projectile point; *h-l*, picks; *m*, *n*, celts; *o*, scraper.

Traces of a House. In our initial trench we had noticed that several of the strata were horizontal at the center of the mound, but began to slope and became nonparallel at about the same point. This random arrangement was characteristic for the remainder of their eastward extension (Fig. 109 *c*: squares C2, C3, C4, strata 10, 12, 14). Stratigraphic excavations of the main sector produced 3 cylindrical concretions (Figs. 109 *d*; 110 8, 9, *10*), the tops of which were flush with the topmost of these horizontal layers. These concretions, composed of firmly conglomerated shells of *Anomalocardia brasiliana*, were 27, 42, and 54 cm. long and 10 to 15 cm. in diameter. They extended unbroken through both shell and ash layers. Their straightness and symmetrical form suggest that these concretions correspond to postholes. It seems possible that the shells from upper layers fell into the void created by the rotting of wooden posts. Under the influence of the rotting vegetable matter part of the lime of these shells was dissolved and then redeposited, solidifying the mass and preserving a mold of the former post.

Correlation of the horizontal strata observed in the first trench with the position of these features interpreted as postmolds showed that the two were associated. The area occupied by the ash layers was a little over 3 m. wide. Length could not be ascertained, but it is greater than the 5 m. observable in the excavated area. A burial (V) was found near the middle of these ash layers, the grave having been excavated when Layer 12 represented the surface of the mound. The 2 shorter postmold concretions were found here, one near the right hip and the other near the right foot of the skeleton. This suggested that they could have served as grave markers, or have originated from posts supporting a shelter over the grave. However, no traces of other such features could be detected in the vicinity of the grave, and the third mold, which is the longest, was found 1.30 m. east of the burial and had no grave association. Furthermore, it was located just at the point where the strata ceased their horizontal orientation. This seems to rule out a grave association and to indicate that the molds represent house posts with the horizontal refuse layers corresponding to successive floor levels.

The use of this dwelling for 3 consecutive seasons is indicated by the exact superimposition of the 3 ash layers. The termination of the postmolds flush with the upper ash layer (Layer 10) and the absence of horizontal strata above this point indicates the structure was not used in later visits. The 2 burials intrusive into the house floors shed some light on the phase with which the structure is associated. Burial V is identified by its orientation and its lithic associations as belonging to Phase C. Burial VI, 1.50 m. to the southeast, is intrusive into the upper ash layer and the artifacts and skeletal orientation are those of Phase B. These associations and the stratigraphic situation indicate that the dwelling was constructed and used during the first 2 seasons of occupation by individuals belonging to Phase C. It was apparently of sufficiently solid construction to survive for a third season, when the mound was occupied by individuals belonging to Phase B. Both groups buried one individual in the hut floor. The shallowness of the graves under the house floors makes it seem possible that the seasonal abandonment of the site took place immediately after each of these interments.

Conclusion. The artifact remains and the refuse forming Araujo II indicate that it is the product of a group whose subsistence was based exclusively on fishing and the gathering of mollusks. Game seems not to have contributed to the diet of these sambaqui dwellers. The thinness of the individual strata, the swift succession of inhabitants with different culture complexes, the shallowness of the grave pits, and finally the absence of game-animal bones, seem to speak against permanent settling, and to point rather to repeated, short visits. It seems unlikely that a group possessing suitable weapons and living during extended periods on the rim of a primeval forest should have limited itself to mollusks and fish without varying its diet with easily obtainable game which must have been plentiful in the vicinity. The intervals between these stays must, however, have been short ones, as no accumulation of humus has so far been noted between the individual strata, either in this sambaqui or in any of the others visited by us.

Three cultural phases are distinguishable in the upper 1.60 m. of the sambaqui deposit, each characterized by a diagnostic artifact assemblage and a specific burial pattern. The sharpness of the transition from one cultural phase to the other indicates successive use of the site by different groups rather than by the same group whose culture was undergoing change.

Neither exact nor relative dating of the deposits of the sambaqui Araujo II is possible at this time. The most significant result of this excavation is the demonstration that stratigraphic sequences can be detected in the sambaqui deposits, and that considerable variation in culture can be represented even in shallow midden accumulations. It has long been recognized that the shellmounds of the Brazilian coast vary greatly in antiquity. If a sufficient number were excavated stratigraphically, it should be possible to show how the cultural contents differ, and from this to establish a relative chronological sequence as well as the geographical variations. We hope that our efforts may stimulate other archaeologists to direct their attention to this large and important task.

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MUSEU PARAENSE
Curitiba, Paraná
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EXCAVATIONS AT NOHOCH EK, BRITISH HONDURAS

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THE COURSE of Maya archaeology has been characterized for the most part by an intensive interest in large ceremonial centers, and justifiably so in view of their clearly rich and rewarding content. Yet the nature of these excavations has necessarily restricted knowledge of preconquest developments in this region to a highly hierarchic level, as witnessed by work in such sites as Kaminaljuyú, Copan, Uaxactun, and Piedras Negras. Remarkably little is known of conditions on a less spectacular level, but a recent trend in this direction is evident in the house-mound and population studies by Carnegie at Mayapan and by Gordon Willey in British Honduras. And we hope that Nohoch Ek, about as insignificant as Maya sites of this type come, may help to illustrate the evolution and workings of an obviously minor ceremonial center. Its points of interest are, first, that it is a very small and compact group, of which there must be hundreds for every Uaxactun; second, that it possesses a long sequence of stratified artifacts and buildings; and, finally, that its content is perhaps more typical of the local rather than climactic ceremonialism achieved in the lowland Maya area. The present paper is simply a summary of work carried out by the writers at this British Honduras site during the summer of 1949.* Space limitations require a minimum of illustrations and comparative references. Fortunately, the ceramics of nearby Benque Viejo have been described thoroughly by J. Eric S. Thompson (1942); the 2 sites share an almost identical pottery.

Nohoch Ek, located midway between El Cayo and Socotz on the land of Captain E. J. Moy, occupies the summit of an artificially leveled hilltop. Structure A-6 of Benque Viejo is visable across the rolling, heavily forested countryside. In ancient times their separation by the Rio Mopan may have been politically important. Both the Macal and Mopan rivers are too distant, though, to have been ready water supplies for the inhabitants of Nohoch Ek. However, a small spring is located nearby and a search disclosed 2 subterranean chambers (chultuns) that might have served at one time or another as cisterns.

The site (Fig. 115) comprises 6 main mounds arranged along the edges of a rectangular plaza, and, off to one side, a small platform (uninvestigated) supporting 3 diminutive mounds. Possible remains of house mounds were observed on the east flank of the hill; these were neither mapped nor excavated. Considerable searching failed to produce either altars or stelae, nor were there signs of a ball court. This apparent paucity of hierarchic traits was further borne out by the total lack of caches, prevalent at so many other lowland sites. Burials were poorly represented in the work done and the few described here were anything but elaborate.

Attention was paid primarily to the contents of Mound I. Other work was confined to east-west trenching of Mound V and the excavation of a chultun, both with limited results. No claim can be made for adequate sampling, nor do negative features necessarily apply to the uninvestigated portion of the site.

Excavation of Mound I disclosed a series of 4 superimposed structures (Fig. 116). The fill of each contained sherds, and architectural levels provided a sealed ceramic sequence. As to procedure, an initial trench was dug against the south face of the mound until the remains of a stairway were uncovered. Its wretched condition forced us to look elsewhere for leads. Trenches consequently were extended laterally across the south base of the mound. When nothing suggestive of a retaining wall appeared, digging was commenced on the north (rear) side near the mound's summit. The west half was first cleared, leaving the other portion as a control. Eventually the whole summit had to be cleared; the resulting structure (Fig. 118) was designated as Structure D, that is, the latest. Excavation of the upper area of the mound's north flank had revealed that Structure D was actually resting on the leveled(?) walls of an earlier and rubble-packed building

* We particularly wish to express our appreciation to the following gentlemen: Sir Ronald Garvey, then Governor of the Colony; E. D. Hone, Colonial Secretary; A. Hamilton Anderson, Archaeological Commissioner; J. Eric S. Thompson, Carnegie Institution of Washington; and, of course, Captain E. J. Moy on whose land we dug. Linton Satterthwaite kindly provided much needed criticism in the preparation of this paper. A detailed study by the junior author of Nohoch Ek artifacts is on file with the Department of Anthropology, Harvard University, while the artifacts are in the Peabody Museum, Cambridge.

(Figs. 116, 119). Structure D was then removed, exposing Structure C (Fig. 117 *a-c*). The latter was cleared as far as was feasible. In time, the area between the central wall sections on Structure C's south side was dug out revealing 2 superimposed platforms (Figs. 116; 120); the upper one was termed B, and the low platform over which it lay is Structure A, the first of the sequence. Bedrock was shortly encountered below A's black dirt fill. Unfortunately, only small portions of these latter structures could be excavated.

On the basis of Mound I and the pottery it contained, the site seems to have been occupied throughout the Preclassic (Formative), also during the Late Classic period, and possibly early Postclassic times as well. Work in Mounds I and V suggests that the site was ceremonially dormant during what was elsewhere the Early Classic period. The following descriptions refer, unless noted, to Mound I.

EARLY PRECLASSIC

Architecture. Structure A is a low (45 cm.) platform with a plastered surface and a small masonry step (Figs. 116, 120). A stucco floor about 20 cm. above bedrock turns up at this step. The intervening fill is a black, sticky dirt that had settled beneath A's surface leaving an empty pocket (decomposition of organic debris?). Across from A is a small masonry step of squared limestone, but whether associ-

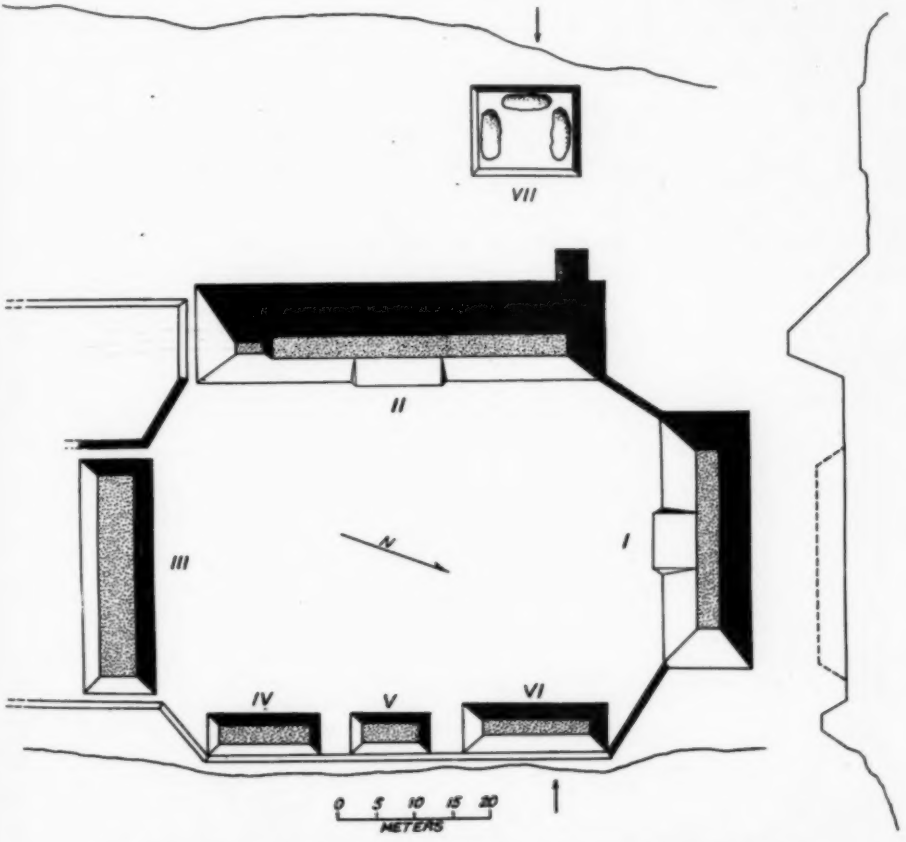

FIG. 115. Idealized sketch map of Nohoch Ek, with section of Mounds VII, II, III, and VI. Magnetic north is shown; declination is approximately 7°.

ated with A or B was not exactly determined. The small portion of A that was cleared failed to produce evidence of a former superstructure, for instance, postholes. To have cleared further would have necessitated dismantling both Structures B and C, an impossible task at the time.

Ceramics. Sifting of the black dirt above bedrock and below Structure A and the associated plaza floor produced a most inadequate sample of 50 sherds. These comprise ceramic Period 1. Predominant ware consists of small red ware bowls, nicely slipped and burnished, about ⅓ of which are incised or otherwise plastically decorated. There is no polychrome. Other bowls are usually unslipped, of brown or gray ware. Most of the vessels must have been quite small, and one sherd is evidently from a miniature bowl. The shapes are simple: outcurved bowls (or dishes), straight-sided bowls, and incurving bowls. All are of simple silhouette. There is no evidence of supports for the vessels; only 2 bases were recovered and these are perfectly flat. Ollas or storage jars were large and well made, with flaring lips. Many of the bowls could have been produced by hand molding from a lump of clay. The paste is fine.

Shells. Fresh-water clam and snail shells were particularly numerous in this deposit.

Discussion. In summary, Period 1 and Benque Viejo la (Thompson 1942) share an identical pottery, which bears certain resemblances to some of the simpler Uaxactun Ia (Mamon) forms (Ricketson and Ricketson 1937).

Little can be said comparatively about Structure A. Elsewhere in the lowland region Early Preclassic pottery is associated with building activity only at Uaxactun, and there in the form of "meaningless rows of stone which are either property boundaries or remains of retaining walls for housemounds" (Ricketson and Ricketson 1937: 136). A number of platforms have been assigned to the Uaxactun Formative but these are mentioned as having been built later than the walls themselves (Ricketson and Ricketson 1937: 231, Fig. 98 *a*). In the highlands, however, building activity of a much more definite nature has been discovered on a level roughly coeval with the lowland Early Preclassic (Shook 1951a: 240-1).

The slight amount of data recovered at Nohoch Ek allows little room for appreciation of development during this very early period. At some time during the first millennium B.C., perhaps earlier, people began to live at the site.

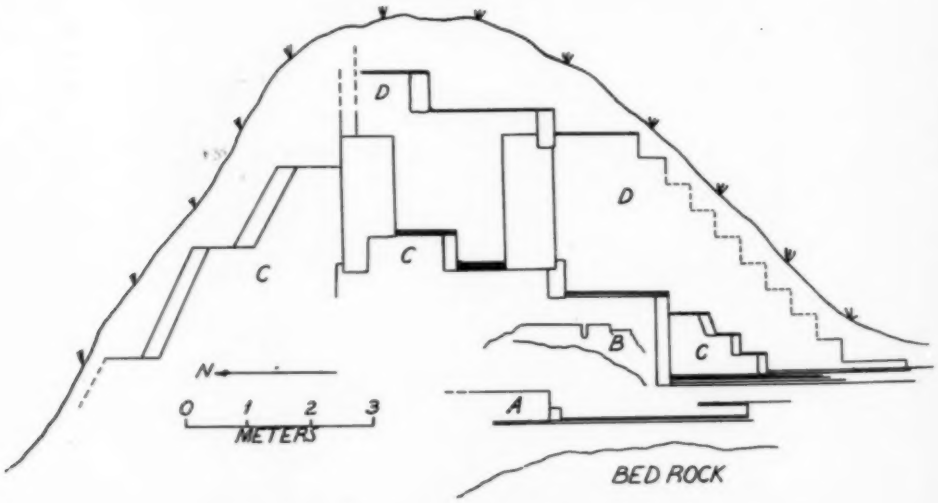

FIG. 116. Partially composite central cross section through Mound I, showing relationships of Structures A, B, C, and D.

Although no actual evidence appeared, cultivation of some staple (maize or manioc) was probably practiced on the flanks of the hill and in the neighboring valleys and depressions. Surely fresh-water clams and snails formed an important part of the diet. From time to time the inhabitants must have found it necessary to level off the rubbish and broken pottery that had accumulated around them in the course of living. The depth of these largely organic deposits is quite considerable, implying an occupation over a fairly long period of time. Also the concentration of potsherds in the small section excavated indicates that the people were equipped with plenty of vessels and containers. These local ceramics show that the site maintained close relations with Benque Viejo at this time but as yet had few contacts with the Petén to the west.

In time the accumulated soil and rubbish was leveled and tamped down to permit the laying of a thick and durable plaster floor of

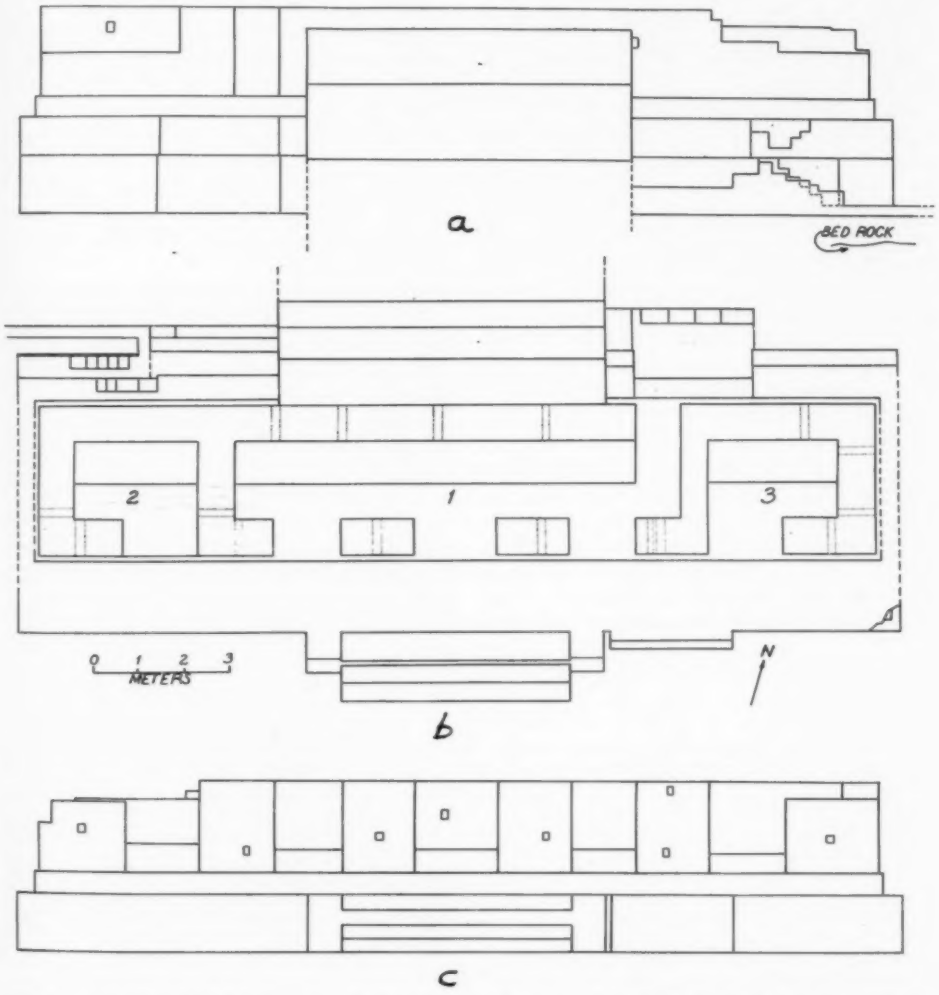

FIG. 117. *a*, north side of Structure C. *b*, plan of Structure C; dotted lines through walls indicate positions of so-called ventilators; Brunton compass reading along south plinth S72°W. *c*, south side of Structure C.

unknown extent. The edges of the hill, where the ground fell off sharply, were built up, probably at this time. At least one low platform (Structure A) was built on the north edge of the surfaced area. It would be premature to claim that this construction represents the emergence of organized ceremonialism with full-time specialization and social stratification. In any event, its builders utilized technics that became basic for much future architecture — they knew the process for reducing limestone to mortar and they had methods of facing stone.

Late Preclassic

Architecture. Structure B, a platform, was found to rest directly above Structure A. A badly ruined stairway projected on the plaza side and evidently had once been painted red. No traces of a retaining wall were found. The fill throughout the exposed area was roughly stratified: large rocks set in a sticky black dirt above the surface of Structure A, then a thick layer of rock and mud. The plastered surface of B was 1.10 m. above the surface of A. Although the platform surface slumps off to the north, enough remained to show a primary foundation bed of plaster molded to the irregularities of the rock and mud fill. No cut stone seems to have been used in its construction. A shallow (24 cm.) posthole was located on the south edge of the platform, suggesting a former pole-and-thatch superstructure.

Ceramics. Period 2 was derived from material in the fill beneath Structure B and above the surface of A, comprising 55 sherds in all. The outstanding shape is the large dish of red ware with thickened and everted lip. The paste of these sherds is frequently buff-ocher, with a black central streak, and the slip is thick with a characteristic soapy feeling. New features, such as the basal angle and the lateral flange, are present. The pottery is still exclusively monochrome and all vessels were probably flat based, without tripod support. Also represented in this small collection is an unslipped olla with flaring rim. Particularly emphasized are plastic modifications of rim form. An incurving bowl with recurved rim, rounded sides, and an appliqué-spiked exterior is also present in this sample. One solid cylindrical pottery object (a mashing implement?) is included in this period. Admixture with Period 1 material is slight.

Burials. A child probably 4 to 5 years of age was represented by a few bone fragments and an incisor about 10 cm. above the surface of Structure A. A nearby chultun yielded 2 burials, one being the fully extended remains of a toothless old man, and the other the bones of a small child. Scattered about were many sherds of Period 2 type, though this need not be the minimum dating for these latter burials.

Discussion. The outstanding feature of the pottery of this period is its identity with that of Uaxactun 1b (Chicanel), and since no sherds later than Period 2 were found in the supporting fill, Structure B may be attributed to the late Preclassic.

Architecture is rather well represented during this period at Uaxactun, regardless of whether or not one accepts E-VIII-sub as a Chicanel structure. Yet points of resemblance between Nohoch Ek and Uaxactun are few. The common use of perishable superstructures

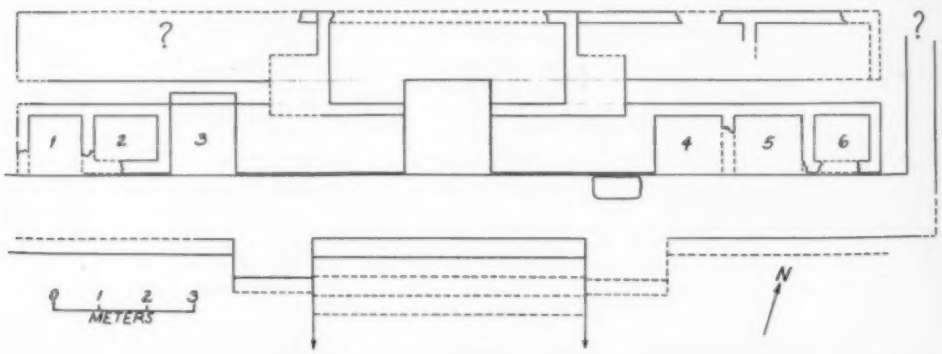

Fig. 118. Plan of Structure D.

is certainly one of these (R. E. Smith 1937: 229; A. L. Smith 1950: 18-19). A heavy layer of plaster applied directly to fill apparently occurs in the Main North Stairway of E-VII-sub (Ricketson and Ricketson 1937, Pl. 35 *a*). And a thick calcareous layer between platform surface and actual fill has been noted in Pyramid A of the Uaxactun A-I complex (R. E. Smith 1937, Fig. 18).

With the possible exception of San José (Thompson 1939: 49), contemporary architecture is lacking at such other British Honduras sites as Benque Viejo and those in the Mountain Cow region. In Northern Yucatan, Yaxuna possesses a very large coeval complex (Brainerd 1951: 76), and, of course, hundreds of adobe structures were built in the Guatemala Valley during late Preclassic times (Shook 1951b: 97-8).

In brief, the Late Preclassic at Nohoch Ek witnessed new influences entering from the Petén, especially in pottery types, which were

FIG. 119. View from east, showing removal of Structure D to reveal C; Room 3 in foreground; note rubble-packed interior of Room 1, supporting Structure D, which is shown here with a portion of its bench, blocked channel, and partially surrounding wall.

FIG. 120. View from south, showing cut between central wall sections of Room 1, Structure C, with positions of Structures A, B, and C indicated by letters.

almost identical with those of Uaxactun 1b. At this time, the people of Nohoch Ek built a small platform that perhaps supported a perishable building, having first buried or reburied a small child in its fill. Formality in religion may have been introduced at this time, if not earlier, resulting in an increasing ritualization and control of local life.

The relationship between Benque Viejo and the site is difficult to assess for this period. Nohoch Ek may have been equally as important as its neighbor but its subsequent minor position may have resulted from the development of a river trade in which it could not share. But that the people of Nohoch Ek were prosperous during these times is obvious from the large amounts of pottery, seemingly Petén imports, all sorts of large and well-fashioned red dishes, polished black bowls, and other monochrome forms. Traders bringing these would have had to trudge long distances over the hilly Petén country with their pots on their backs until they reached the rivers of the

Belize River drainage. From here they undoubtedly took canoes to the settlements downstream and to the towns inland from the waterways. Perhaps the strategically located inhabitants of Benque Viejo acted as middlemen in this inland commerce.

It is evident from the burials that certain people at the site were receiving at this time rather special treatment and this may supplement the architectural indication of a class structure.

As pointed out below, what can be interpreted as a form of abandonment brought to a close the late Preclassic period of Nohoch Ek.

Early Classic

Evidence for this period, one of outstanding importance elsewhere in Mesoamerica, failed to appear in the work done at the site. Structure B showed indications of neglect. Sherds collected from the fill of Structure C (overlying B), some 40 in all, pertain either to Period 2 (Chicanel) or to Period 4 (Tepeu). Only a single sherd, from a black cylindrical vessel, recalls the Early Classic period. It is decorated with champlevé carving and some incision, and was probably part of a cylindrical tripod vase. However, in paste, slip, and firing this sherd resembles a typical Period 4 ware known as slate, so the sherds could date from that period. Trenching of Mound V produced no sherds earlier than those of Period 4.

Early Classic diagnostics, then, are lacking at the site *so far as it was investigated*. Had ceremonial activity persisted there during this period, roughly 300 years long at other sites, surely some trace should have been found. Period 3, presently without content, represents a gap in the local sequence.

This apparent hiatus may be due, not to the complete abandonment of the site, but rather to the suspension of its organized ceremonialism, its pottery and architectural activity. Economic conditions of the still-resident farming population may have precluded imports of fine, typically Early Classic polychromes, even if such wares were lay objects at this time. The manifest florescence of so many Mesoamerican centers may have actually absorbed the guiding faction of such tiny communities as Nohoch Ek. It is possible that the removal of formal control and responsibility at such sites resulted from a secular revolt of the supporting population. No positive evidence, of course, exists for any of these suggestions. Still, traces of the Early Classic at Benque Viejo are confined entirely to a small group of surface sherds (Thompson 1942: 8). If not Uaxactun then other more proximate sites as San José, Mountain Cow, or Caracol (Satterthwaite 1954), all sites with ample evidence of occupation at this time, may have disrupted temporarily the ceremonial functioning of negligible sites like Nohoch Ek. It is inconceivable that the hierarchic group responsible for Nohoch Ek during the Preclassic era was attracted by the impressive florescence of other centers in the area, abandoning its rural accomplishments for resident participation in the growth of a center like Caracol or Uaxactun or Holmul. And for the duration of the Early Classic, the Nohoch Ek farmers were either left on their own or apportioned directly to some other center in the vicinity.

Late Classic

Architecture. This period is represented by Structure C (Fig. 117 *a-c*) and by Structure D (Figs. 116, 118) which overlies C. The earlier building, C, was a small palace-type of structure. The central room (Room 1) was built first and, at some later time, the 2 end rooms were added, their floors overlapping and concealing the east and west terrace extensions of Room 1. The final result was a rather pleasing building set on a low platform with a terraced substructure. The south wall of Room 1 was broken by 3 doorways and the north wall by a single wall-jamb doorway. Rooms 2 and 3 each have one entrance. All 3 rooms contain a bench along their respective north walls. At least 2 stairways were encountered. The first, rising from the plaza to the terrace, features battered stair-side extensions; the substructure retaining wall runs behind the stairway (Fig. 116). The second is located on the northwest side, forming part of the substructure at that point. A possible third may have occurred once on the northeast side, providing access to Room 1 via its north doorway. Another interesting feature is the stepped functional buttress that rests against the north side of the building and its substructure. Further buttressing was found on the south side just east of the stairway. This building contained 16 ventilators, and their locations are indicated in the structure plans (Fig. 117 *a-c*). Room 1's south-

east wall section is perforated in 2 instances. The southwest corner of this same room has 2 adjacent ventilators, to the south and to the west; the latter apparently was blocked with the addition of Room 2. Furthermore, the ventilators along the north wall of Room 1 were found packed with rubble with their interior openings plastered over. Whatever their function may have been, it was destroyed when it became necessary to build an obstructing buttress against the outside of the north wall.

One clue to the purpose of these problematic features may lie in the "T"-shaped openings so typical of Palenque and also found in a Piedras Negras sweat house. The "T" element as the day glyph "IK" may be translated as "breath" or "wind." One thus wonders whether these wall perforations may not have served for the evacuation of internal malevolent winds through rituals of purification such as sweat cleansing and less obvious means. While at few sites these exits may have been given symbolic shape, at the majority simple rectangular openings were used, of perhaps identical function but with less patent associations. Curiously they do not seem to be a feature of Puuc buildings.

No indications of a roof, corbeled or otherwise, were encountered. Wall summits in most instances were found to be smooth. As to masonry, blocks were used throughout the building with little attempt at coursing. The use of spalls in interstices was very common. Gross bonding of corners occurred. The use of large rectangular stones was confined to the northern buttress. Floors, walls, and bench surfaces were coated with distinct layers of smooth unpainted stucco.

This building poses a number of structural problems. For instances, the wall separating Rooms 1 and 3 was somewhat less than the normal 80 cm. thickness of other walls and, furthermore, contained serious cracks (foreground, Fig. 119). Also the north wall of Room 1 had a decided outward bulge. Addition of a buttress may have been prompted by these apparent weaknesses. And there is the problem of the roof type used on this structure and its relationship to both the buttress and the seemingly rebuilt transverse wall between Rooms 1 and 3.

Structure C may be dated as Late Classic on the basis of pottery. It will be remembered that signs of Early Classic occupation are virtually lacking, the fill between Structures B and C containing sherds of Chicanel and Tepeu affinity. As is pointed out below, the fill of Structure D produced quantities of distinctly Late Classic, Tepeu sherds, and none of later date. However, were one to disregard the ceramic evidence and rely entirely on architectural traits as diagnostic, one might conclude that C is in fact Early Classic. Certainly vertically applied veneer masonry is lacking, an important trait of Uaxactun Late Classic construction (A. L. Smith 1950: 70-1). The strength of Nohoch Ek walls lay very clearly in their block masonry rather than in a consolidated hearting as is the case elsewhere in instances of Late Classic veneer work. The former is also true for the ceramically coeval intrastructure of Benque Viejo B-1. But, unlike Nohoch Ek, Benque Viejo saw a rapid shift to veneering, for the overlying structure features that current type of masonry (Thompson 1942: 2-3).

On the other hand, a progressive factor may be present in the main stairway of Structure C, since its masonry resembles that employed during the Late Classic at Uaxactun, the risers being composed of well-cut stone applied to a hearting of mortar and rubble which forms the balance of the tread. This method is opposed to an earlier one in which both riser and tread were formed by well-cut blocks alone (A. L. Smith 1950: 75). In its projecting form the stairway of C is fairly common throughout the area, but the use of stair-side extensions is generally a rare feature. A comparable example, on a much larger scale, occurs in Structure A-V at Uaxactun during the Late Classic period (A. L. Smith 1950, Fig. 69). At Nohoch Ek, a local idiosyncrasy may occur in the coincidence of the extensions and the second riser from the top. But on the whole, the form of this stairway suggest central Petén influence (via Benque Viejo?). It not only reflects the partially inset stairways found, for example, at Uaxactun, but possibly an attempt on the part of the local builders to emulate, through stair-side extensions, the receding substructures of the elaborate and undoubtedly dominant Petén centers. Attempts to bring provincial architecture into line with important

current trends must have occurred in ancient times and it is merely suggested that one such attempt may have taken place here.

As regards the curious stairway on the northwest base of C, its masonry, though Early Classic by Uaxactun standards, was almost by necessity of the overlapping block type. And while complex narrow stairways are found interiorly at Uaxactun, San José, and in a few sites just north of the Petén, their use in this design on the exterior seems to be unique to Nohoch Ek. The same is true for the stepped and surely functional buttress, for while such constructions do occur at other sites, they seem to have been a decorative rather than structural necessity.

Structure D, which concludes the architectural sequence in this mound, was found to be supported largely by the walls and rubble-packed interior of the preceding Structure C (Fig. 119). Seriously damaged by erosion and tree roots, this hard-to-characterize building presents a number of perplexing problems, not the least of which is that of function. Clearing revealed 2 parallel ranges of adjacent enclosures, hardly rooms, centrally divided north-south by a recessed area containing a block-masonry, stucco-covered bench, and further divided on an east-west axis by a plastered channel that had once opened into this recessed area prior to intentional blocking (Figs. 118, 119). The enclosures are quite small and cubical. Numbers 2 and 6 seem to have been closed off on their south sides; this probably was true for the others as well. The condition of the north range allows few comments. The location of Number 3's north wall is curious, displaced as it was into the channel. Another point of interest is the north wall of Enclosure 4, in that its masonry had been faced on the channel side and left rough on the reverse or enclosure side.

The channel (perhaps a misnomer) averaged about 50 cm. wide with a variable depth depending on the elevation of adjacent enclosure walls; its bottom was paved with a heavy layer of plaster slightly concave in cross section.

Remains of a wall enclosed the central bench on its east, west, and south sides (Figs. 118, 119). At one time this area also was walled in along the north side of the bench. Degenerate in workmanship, this wall rested directly on the bench's plastered surface. With the addition of these walls (foundations for a perishable superstructure?), at least the north range of enclosures seem to have been filled and covered by a plaster floor, essentially an extension of the upper surface of the bench. The level of all enclosure floors corresponded well with that of the recessed area fronting the bench. A large rectangular piece of limestone rested on the terrace near Enclosure 4 (Fig. 118). Neither this nor any other part of the structure was painted or decorated beyond simple plastering.

The present plan indicates about all that was recovered of the centrally located stairway and the substructure against which it rested. The stairway rose from a low broad basal step to terminate at a narrow terrace, the whole rising between flanking projections of that terrace. These projections seem to have dropped to the plaza level at an angle more acute than that of the stairway (Fig. 118). The south face of the substructure was clearly battered. Investigation of the east and west ends of both C and D was slight but in the debris to the north a number of large masonry fragments indicate that Structure C very likely was enclosed completely by Structure D.

In summary, Structure D is composed of a narrow rectangular substructure of relatively poor workmanship, topped by a bordering stage, with a centrally located stairway leading from the plaza up to this narrow stage. Resting directly on the apparently prepared walls of Structure C, it is a problematic building of a seemingly unique design. With the addition of walls, and whatever they supported, around a well-constructed central bench, architectural activity ended, at least in this location.

Ceramics. A Period 3 was assumed for the site even though evidence of Early Classic (Tzacol) times was lacking in the work done. As pointed out, this time span may represent a true hiatus, but it is possible that our sampling was insufficient and further work in test pits, mound trenching, and so on will produce this period, well represented at other sites, at Nohoch Ek as well. The important point is that a number of typically Period 4 (Tepeu) sherds were encountered in the fill between Structures B and C. Furthermore, the sherds found in the rubble-packed interior of Structure C and particularly in the fill of D's stairway are clearly of Tepeu affinity and of nothing

FIG. 121. Imitation plumbate jar found in debris overlying Structure D, Period 5. Height 13.7 cm.

later. Thus Structure C was sealed between deposits of Late Classic sherds and can be dated to that period, regardless of architectural details such as masonry.

Period 4 is composed of sherds from the supporting fill of Structure D. A sample of about 800 sherds was used for study. The outstanding pottery is polychrome ware, a component that serves to link this site with others in the Belize River drainage area. This polychrome is not elaborate, the design usually being in red and black on a neutral background, often vinaceous-tawny in color (Ridgeway nomenclature). The motifs are curvilinear, geometric, or stylized glyphic. A few sherds show life forms, some with full and possibly meaningful glyphs, for instance, the "kin" sign. Common polychrome forms are the tripod bowl with outslanting sides, the globular vase with constricted neck, the barrel-shaped jar, and the cylindrical vase.

There is a great variety of red wares in this period, and even the finer types, such as the lateral-ridged dish, are common Nohoch Ek items. There is a wide range of decorative technics — incision, punching, fluting, modeling, and so forth. The forms are also varied, from shallow dishes to tall vases (for the latter, see Fig. 122). Bases often have ring or tripod supports, the latter frequently being tau-shaped but never hollow.

Vinaceous-tawny ware is important in Period 4. In form, it ranges from the tripod bowl with outstanding sides and "nubbin" feet to the incurving, flat-based, barrel-shaped jar. This ware was very popular and much used in both its plain and polychrome form, as much-worn feet testify.

"Service" wares include the very curious pottery known as fugitive-black ware. The surface of the vessel is covered with a black paint or slip which rubs off easily, and which may have been applied after firing. Fugitive-black shapes consist of incurving bowls, usually with beveled rims, and ollas of all sizes and forms (Thompson 1942, Figs. 50-3).

FIG. 122. Late Classic modeled cylindrical vase with alternating geometric and curvilinear bands, and highly polished red slip on fine-textured buff paste. Height 23.8 cm.

Local frugality is suggested by 8 crack-laced sherds.

Period 4 pottery, although it has many general and a few specific resemblances to Alta Verapaz and Petén ceramics, has its closest parallels in pottery from other sites of the Belize River drainage. One can immediately see that it is almost identical with the ceramics of Benque Viejo III, although the typical curvilinear designs on Benque Viejo IIIb vinaceous-tawny polychrome has only one representative sherd at Nohoch Ek, and only slightly differentiated from San José III and IV. It is also identical with much of the pottery from Baking Pot in the collections of the Peabody Museum, Cambridge, and A. H. Anderson.

Turning now to Period 5, its most striking feature is the total absence of polychrome, except for a few redeposited and weathered sherds. The study collection comprises about 100 sherds and a few almost complete vessels. These sherds are derived from surface collecting, near-surface deposits, and the debris overlying Structure D, and represent the period of that building's use as well as a possible post-constructional phase.

The new wares featured in Period 5 include incurving red ware bowls with sharply recurved rims, fugitive-black incurving bowls with flat rims, and large, heavy ollas with strongly outcurved necks and overhanging rims. The fugitive-black incurving bowl with beveled rim persists, but probably dies out toward the end of this period, as at Benque Viejo, since the flat-rim form is predominant in surface deposits. The absence of polychrome is duplicated in the latest periods of other Belize River drainage sites, such as Benque Viejo IV and San José V.

Other noteworthy additions in this period are the oven-footed tripod bowl and what is undoubtedly an imitation plumbate jar. The former, a red ware form, is found in Uaxactun III and Benque Viejo IV, and on it the hollow tripod support appears for the first and last times at Nohoch Ek. It was probably made in the vicinity and derives from the Uaxactun form. Imitation plumbate ware is represented by a reconstructed vessel (Fig. 121) and 2 unrelated sherds. In form, these comprise small, globular jars with cylindrical necks, and flat bottoms. The reconstructed example has a diameter of 13 cm. at its widest point, an orifice diameter of 7.3 cm., and a height of 13.7 cm. Reddish in paste, it is calcite tempered (information from A. V. Kidder) and possesses a reddish brown underslip, with a red, polished, slightly flaky outer slip. The neck interior is slipped while the base is unslipped and buff colored. Incised lines are found on all specimens, apparently an attempt to duplicate typical plumbate grooving. Horizontal lines are found on the shoulder just below junction with the neck. This jar immediately involves the site in the chronological and cultural questions of plumbate itself. Here one can only refer to Shepard's study (1948) of this most interesting pottery. Briefly, the presence of these specimens might suggest that Period 5 covers not only the terminal Late Classic but something of the Postclassic as well. It should certainly be noted that the fragments of the reconstructed jar were found deep in the debris near the northwest corner of the mound, well up on the mound's flank and overlying Structure D. True plumbate has been found in a local cave (Thompson 1942: 30).

Further evidence that Period 5, at least in part, is closely related to Benque Viejo IV is found in such traits as pottery lids and the annular base. Period 5 shares few, if any, features with San José V except for the general lack of polychrome (Thompson 1939: 151). Evidently, Nohoch Ek and Benque Viejo formed at this time a small and local ceramic area having but few contacts with Uaxactun and possibly Baking Pot.

Other Artifacts. Chipped flint tools were relatively common. "Choppers" of limestone and flint, typical in other lowland Maya sites, were encountered in deposits of Periods 4 and 5. Two were found in the fill between Structures B and C (late Preclassic or Late Classic). A number of poor-grade white flint awls and scrapers fall in Period 4. Black or gray prismatic, core-struck obsidian blades, unretouched, are seemingly scare (all from Periods 4 and 5). Notably absent were projectile points; tropical woods may have been used instead of stone. Legless granite metates of both trough and turtle-backed varieties and tapered manos were also uncovered (Period 4 and 5). Other artifacts include a greenish stone polishing dish, limestone rubbing implements, a small mortar, small spherical stone balls, and a hammerstone. Figurines of clay are rare and all are from Period 4; the unimpressive collection is made

up of 3 fragmentary bird whistles and a painted, hollow fawn's head. Effigy incense burners are represented by 2 sherds in Period 4. This same period produced an unslipped, multiply perforated sherd presumably from a ladle censer. A few scored grater(?) fragments and mashers or mullers are also of interest. Two hollow deer bone flageolets, each with 2 small drilled holes about 5.5 cm. apart, accompanied a burial in the fill of Structure D's stairway.

Burial. Incomplete remains of an adult, possibly a secondary burial, were found in the fill of Structure D's stairway, accompanied by the bone flageolets described above, and an obsidian flake blade. The bones showed no trace of coloring matter.

CONCLUSIONS

Lacking stelae, altars, ball courts, and, as far as digging went, both caches and impressive burials, Nohoch Ek still evidenced long ceramic and architectural activities. These began and continued throughout the Preclassic, were renewed during the Late Classic and possibly ended in the beginnings of the Postclassic. The local pottery shows the following sequent phases: (1) an early monochrome horizon during which the site was in close contact with Benque Viejo only; (2) a more elaborate monochrome period in which the site was part of a general lowland style centering in the northern Petén; (3) an apparent hiatus roughly the equivalent of the Early Classic elsewhere; (4) a Late Classic horizon with polychrome, in which the site was part of the Belize River drainage ceramic area; (5) a Late Classic to possibly Postclassic monochrome horizon during which Nohoch Ek appears to have been in close contact with the El Cayo-Benque Viejo locale. Four superimposed structures were uncovered in Mound I, the earlier 2 being small platforms and dateable at Preclassic, followed in Late Classic times by a small palace type of building with certain unique features, and, finally, by a very perplexing structure without known precedent.

The excavation data, while none too numerous, suggest something of the manner in which the site functioned, its role as a marginal ceremonial group, its supporting population, and its connections with other neighboring sites. It is unlikely that a center of this size could have existed independent of a much more important place like Benque Viejo, or even Cahal Pech (Satterthwaite 1951: 22). Construction of plazas and palaces, even on this scale, implies considerable communal effort that would have had to have been made under the direction of some authority. Other comparable sites abound in the immediate area, particularly on hilltops. This proximity and concentration, together with occupational debris and possible house mounds, suggest that minor sites like Nohoch Ek may have been under the control of ruling lineages that ultimately owed allegiance to Benque Viejo or Cahal Pech, and they in turn to still more important centers. The lineage, with its religio-governmental role, probably did not occupy the plaza area but rather the adjacent slopes, with the farming people on the cultivable but more humid sections below. While class stratification existed, it may not have been quite so severe as in some dominant center like Uaxactun.

The plaza and its buildings would seem to have served to centralize and formalize, even intensify, a religion very much colored by the natural uncertainties of agricultural life. The site saw the performance of relatively minor rituals while more important functions perhaps took the population to Benque Viejo.

Many factors must have been at work at Nohoch Ek, entering into its growth and eventually leading to its collapse as a local focus of control and religious ritual. The more important might include the following: political and religious allegiance to ever-increasing authority; reciprocity between priestly or semipriestly lineage rulers and farmers who wished assurances for their fears; the need of an elaborate context for those assurances; and, finally, a gradual tendency on the part of the farmers to reject increasing demands of a swollen religion grown too remotely symbolic for their understanding. Factually, one can say that its people were spinners, users of pots, maize cultivators, clam and snail eaters, and builders of stone structures, as well as emulators, recipients, and occasionally originators. Beyond that, further digging can only redeem unwarranted speculation, which the present writers probably have not altogether avoided.

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ANIMAL REMAINS FROM FOUR PRECERAMIC SITES IN FLORIDA

WILFRED T. NEILL, H. JAMES GUT, AND PIERCE BRODKORB

THE PRESENT article is an attempt by zoologists to draw conclusions from the vertebrate and other remains found in certain midden sites. Some of the remains have been discussed in papers presented at meetings of the Florida Anthropological Society (Brodkorb 1953; Gut 1952).

Two of the authors have been interested in local archaeological problems, as such. In addition, helpful advice was had from Ripley P. Bullen, Curator of Social Sciences at the Florida State Museum; from John M. Goggin, of the Department of Sociology and Anthropology, University of Florida; and from John W. Griffin, of the St. Augustine Historical Society (Florida). Thanks are due to these archaeologists; also to Barney R. Beck, owner of the Lemon Bluff site; to Bernard S. Good, owner of Good's Shellpit; to J. E. Price, owner of the Bluffton site; to Jerry Allen, manager of Silver Glen Springs at the time excavations were made there; to James B. Gut and Marjorie A. Briggs for assistance in collecting; and to E. Ross Allen for skeletal material useful in identifying the midden remains.

The mammal bones are in the possession of Gut, the bird remains in the collection of Brodkorb or in the Florida State Museum. The incised specimen of pathological bone and most of the reptile and amphibian remains are in the possession of Neill. Some of the reptile bones from Bluffton are in the Florida State Museum, as are certain heavily mineralized specimens from this site.

Animal remains discussed herein date from preceramic Archaic times, which began in the Southeast at least 5000 years ago (Hurt 1953: 215-6), and which terminated locally about 3500 years ago (Goggin 1952, Fig. 2).

The sites studied are known as Lemon Bluff Midden, Bluffton Midden, Silver Glen Springs Midden, and Good's Shellpit. They have been designated Vo 61, Vo 22, La 2, and Vo 135, respectively, in the state-wide archaeological survey.

The 4 sites lie in Subarea II of the northern St. Johns area, as defined by Goggin (1952: 17). All of them are large middens on or very near the St. Johns River. Good's Shellpit is about 12 miles west-northwest of Lemon Bluff; Bluffton is about 19 miles north-northwest of Good's Shellpit; Silver Glen Springs is about 15 miles northwest of Bluffton.

The existence of preceramic levels at these middens has been demonstrated since the publication of Goggin's monograph (1952) on the area. It is not surprising that a preceramic horizon exists at the sites; most of the very large shellheaps of the St. Johns probably date back to early Archaic times. Recent removal of shell for road fill has exposed the deeper levels which previously were difficult of access. Eleven other middens, wholly or partly preceramic, have been reported from the general vicinity (sites La 16, La 21, La 32, La 36, Mr 2, Mr 40, Se 5, Vo 4, Vo 7, Vo 19, and Vo 44 in Goggin 1952: 43).

The Lemon Bluff site is a large shellmidden located on a backwater of the St. Johns River, in Volusia County, Florida, about 8 miles east of Sanford. The depth of the shell has not been determined, but in most places it exceeds 10 feet. The lower levels of the shell are below the present water table. Much of the midden has recently been removed for road fill. Pottery is confined to the upper 2 feet of the midden. Lemon Bluff appears to be a preceramic site which was reoccupied during the much later St. Johns II period. Further remarks on the site are to be found in Goggin (1952: 92), Gut (1952), and Gut and Neill (1953).

Good's Shellpit is a large midden on the St. Johns River, in Volusia County, Florida, about 6 miles northwest of Sanford. At this site, pottery (including St. Johns Check Stamped ware) is confined to the upper 3 or 4 feet of one small area farthest from the river. Most of the midden is an impressively large expanse of shell, completely without sherds. The site, like Lemon Bluff, appears to be a preceramic one which was reoccupied during St. Johns II times. For further remarks see Gut (1952); also Gut and Neill (1953).

The Bluffton site is located on Lake Dexter, a lagoon of the St. Johns River, in Volusia County, Florida. It is, or was, one of the largest shellmiddens in the state. Originally it covered several acres, and the shell was piled in places

to a depth of 20 feet or more. The deeper levels of the shell are 4 or 5 feet below the present water table, even during times of low water; and throughout the unusually rainy summer of 1953, the lowest level was submerged to a depth of at least 10 feet. Most of the site has recently been removed for road fill. During the removal, archaeologists from several institutions made studies there. The complete findings have not been published, but some preliminary comments have appeared (Griffin 1952b: 323; Sleight 1952: 1). Neill subsequently collected reptile remains from a level about 15 feet below the original midden surface. The Bluffton site appears to have been occupied for millennia. A large portion of the midden was accumulated during preceramic times. Above the preceramic levels was a zone of plain fiber-tempered pottery, and above that a zone of decorated fiber-tempered ware. Later horizons were also represented. For further remarks see Bullen (1955), Goggin (1952: 89), and Neill (1954). Griffin (1952a: 20) provides a photograph of a small portion of the Bluffton midden; it illustrates the remarkable quantity of shell there.

The Silver Glen Springs site, or that part of it under consideration here, is a very large shellmidden, located about 9 miles northwest of Astor, Lake County, Florida. The midden borders a group of large springs, the combined flow of which forms a sizable river. The spring run is about 0.6 miles long, and empties into Lake George, a portion of the St. Johns River system. According to local residents, at one time the shell was piled in places to a depth of 20 feet or more. However, vast quantities of it were removed to pave roads in the Ocala National Forest, and a dozen or more houses are now scattered over the remainder of the midden. Excavations were made in a part of the site from which about 10 feet of overlying shell had already been removed. A test cut was carried down another 4 feet, in undisturbed shell. As might be expected, no sherds were encountered at this depth. At Silver Glen Springs, the lowest levels of the shell are at least a foot or two below the present water table, and in places are compacted into a very hard breccia. Much of the midden is preceramic; fiber-tempered and later horizons are also present. For additional observations see Goggin (1952: 88).

Examination was made of vertebrate remains from the sites under consideration. Remains of fishes were not studied intensively. No tabulation was made of mammal bones from Bluffton and Silver Glen Springs. Thus the account deals with the mammals from Lemon Bluff and Good's Shellpit; and with the birds, reptiles, and amphibians from all 4 sites. The preceramic levels of the various middens quite possibly were accumulated under similar ecological and cultural conditions; but the remains from the different sites have been tabulated separately as well as totaled.

All bones found, if complete enough for identification, were saved, examined, and tabulated, with exception of human remains and some fragmentary deer bones. The number of deer bones listed from Lemon Bluff and Good's Shellpit is somewhat less than the actual quantity found.

Bones were identified by careful comparison with skeletonized specimens of known identity. In most cases, identification below the level of species, that is, to subspecies or geographic race, was not feasible.

Obviously, the number of individual animals present could not be determined; a femur and an ulna of a given species might or might not represent the same individual. However, a minimum figure could be ascertained. Thus a collection of bones including, say, 10 right femora of a given species, would indicate as many individuals, whether or not others were present. The accompanying tables give both the number of bones and the minimum number of individuals of each species. The 2 figures are separated by a diagonal, the number of bones being to the left.

Reptiles and Amphibians. Five turtle shell fragments from Bluffton could be identified only as to family (Kinosternidae, the mud and musk turtles); they may represent the common mud turtle or some other species.

Certain shells of the box turtle, *Terrapene carolina*, were recovered nearly intact; they conform in size and shape with those of *T. c. bauri*, the subspecies now inhabiting the Florida peninsula. They differ from shells of the Gulf Coast race, *T. c. major*, and from those of the giant Pleistocene box turtles.

The yellow-bellied terrapin, *Pseudemys scripta*, was absent from the midden material. It once occurred in the region, as evidenced by

mineralized remains from stream-bottom sediments; but it is now lacking from this section of Florida, and evidently was lacking in Archaic times.

Two species of terrapins, *Pseudemys nelsoni* and *P. floridana*, were present, but the numbers of each could not be determined owing to their close similarity in many skeletal parts. Thus the remains of these 2 species are lumped in the accompanying Table 15.

The Indians were preying upon every species of turtle now inhabiting the area, with the possible exception of one mud and 2 musk turtles (family Kinosternidae). Both mud and musk turtles are quite small, seldom over 4 inches in shell length. When seized, they emit a very foul odor. There is little to commend them as an article of diet. If turtles were gathered mostly for food, as seems probable, the paucity of kinosternid remains is not surprising.

All the gopher tortoises and snapping turtles were large, as were most of the terrapins. All but one of the box turtles were full grown, and the chicken turtles were unusually large. Evidently the Indians disdained small turtles. An exception was made in the case of the soft-shelled turtle; fairly small individuals of this species were often gathered. This was to be expected, for a soft-shelled turtle yields a great deal of meat in proportion to its size. Furthermore, it is especially savory, at least by modern standards.

The selection of large turtles does not represent a primitive conservation measure, for the larger soft-shelled turtles and terrapins are mostly females. This fact would have been evident when the reptiles were butchered, as eggs would often have been noted.

The fragmentary condition of most turtle remains suggests that the shells were broken by pounding. The plastron (lower shell) evidently was a favorite point of attack; nearly all fragments of plastron are quite small. Shell fragments are neither charred nor calcined, as probably would have been the case if the reptiles were cooked before they were opened.

Apparently the Indians often opened box turtles in another and very effective fashion. In this species the plastron consists of 2 movable lobes which will fit against the carapace (upper shell). When disturbed, the reptile withdraws its head and appendages, then tightly closes the shell. The Indians merely chipped or broke away the posterior margin of the carapace, thus leaving a gap between upper and lower shell. Into this gap a stick, or perhaps the fingertips, could be inserted; the posterior lobe of the plastron could then be prized, pulled, or broken

SPECIES	VO 135	VO 61	VO 22	LA 2	TOTAL
SOFT-SHELLED TURTLE, AMYDA FEROX	96/29	33/9	26/9	11/3	166/50
FLA. RED-BELLIED TERRAPIN, PSEUDEMYS NELSONI, & FLA. TERRAPIN, PSEUDEMYS FLORIDANA	86/21	21/4	53/17	15/4	175/46
BOX TURTLE, TERRAPENE CAROLINA	8/5	6/4	4/4	0/0	18/13
GOPHER TORTOISE, GOPHERUS POLYPHEMUS	12/6	29/6	20/11	1/1	62/24
SNAPPING TURTLE, CHELYDRA SERPENTINA	7/3	0/0	0/0	1/1	8/4
CHICKEN TURTLE, DEIROCHELYS RETICULARIA	3/2	1/1	0/0	0/0	4/3
COMMON MUD TURTLE, KINOSTERNON SUBRUBRUM	2/1	4/1	0/0	0/0	6/2
UNIDENTIFIED MUD OR MUSK TURTLES	0/0	5/1	0/0	0/0	5/1
ALLIGATOR, ALLIGATOR MISSISSIPIENSIS	26/6	0/0	8/5	4/1	38/12
EASTERN DIAMONDBACK RATTLESNAKE, CROTALUS ADAMANTEUS	9/4	2/2	5/2	5/2	16/8
BULLFROG, RANA SPECIES	2/2	0/0	0/0	0/0	2/2

TABLE 15. Reptiles and amphibians. Total number of bones, followed by minimum number of individuals represented.

away. In consequence, box turtle remains include carapaces that are intact except for the posterior portions, and small, battered fragments that had been broken from the carapace margins.

The remains of terrapins and soft-shelled turtles included abundant shell fragments and portions of the appendicular skeleton, but no neck vertebrae or skull bones. Probably the reptiles were beheaded when caught, a wise procedure. These turtles, especially the soft-shelled species, bite severely when molested and so are awkward to carry unless decapitated.

The scarcity of mud and musk turtle remains, the general lack of small turtles except in the case of the soft-shelled species, the fragmentary condition of most plastra, the treatment of box turtle shells, all suggest that turtles were gathered mainly for culinary purposes. This has usually been assumed, but not demonstrated. It also appears that the turtles were removed from their shells before cooking; one might say that the reptiles were dressed.

Although small turtles are more numerous in the wild and more readily secured than large ones, the Indians generally disdained them. Thus it seems probable that there was no shortage of food.

The soft-shelled turtle and the terrapins are aquatic and rather elusive. In contrast, the box turtle and gopher tortoise are terrestrial, easy to find and to catch. Yet the aquatic species were the ones collected in abundance. The Indians must have been hunting mostly along the river. If they had wished merely to catch turtles, they should have had much greater success hunting gopher tortoises on the high ground. Probably the capture of terrapins and soft-shelled turtles was incidental to the search for mollusks. In wading the shallows, watching and grubbing for snails and clams, one would frequently encounter terrapins and soft-shelled turtles. Of course, it is possible that these aquatic reptiles were taken in weirs or baskets, or that the females were caught by hand when they ventured on land to lay eggs. In any event, the turtle remains suggest that the Indians were deriving their sustenance mostly from the river.

The snapping turtle is also aquatic. However, in this area it is more often encountered in lakes and ponds than along river margins. The larger specimens forage mostly at night, and rarely occur by day in the stream shallows where the terrapins and soft-shelled turtles are so numerous. The scarcity of snapping turtle remains is therefore not surprising if one assumes that the Indians hunted mostly along the river, and by day.

The chicken turtle, although aquatic, is largely confined to small ponds, especially those in low flatwoods, and very seldom inhabits streams. The scarcity of chicken turtle remains confirms the supposition that the Indians hunted mostly along the river.

Reptiles are sometimes very exacting in their habitat requirements. A given species may be confined to a certain type of pond or stream or plant association. From the presence of so many turtle species, one may postulate that the area was ecologically diverse in preceramic times just as at present. It is known, of course, that the sites lay on or near a river. Probably there were shallow lagoons, backwaters, and small tributary streams, about which the soft-shelled turtles and terrapins could be caught. The box turtle is most common in pine flatwoods; the chicken turtle occurs about small ponds, especially those in low flatwoods. The presence of the gopher tortoise implies the existence of some relatively high, dry areas, probably covered with rosemary scrub or else with turkey oak and longleaf pine.

Omitted from Table 15 is a nuchal bone of a turtle, collected at Good's Shellpit. It exhibits an arrangement of scutes not previously reported for any North American turtle, recent or extinct. Probably the bone represents an anomaly rather than some hitherto undiscovered species. With the dubious exception of this bone, all the turtle remains are of species now existing in the vicinity of the sites.

Alligator remains represent medium-sized or large individuals, 4 feet or more in length. Several vertebrae are from 10-footers, and 2 large scutes from Bluffton Midden were from 12-foot individuals. Small alligators are much easier to secure than large ones, but the Indians apparently disdained them just as they did small turtles. Again one finds evidence of an abundant food supply. Probably most of the alligators were found in lagoons and backwaters along the stream; they would often be encountered during a search for mollusks. Alligators are common today in the vicinity of all 4 sites.

The Lemon Bluff site yielded a mass of fish bones and other remains, cemented together in a sandy matrix. Since feces (probably of dog) are sometimes encountered in the shell heaps, this mass was at first taken to be the droppings of some large, fish-eating mammal. Laboratory examination of the object proved otherwise. The mass consisted largely of sand and clay, imbedded in which were a few small fish vertebrae, a portion of a fish skull, and tiny fragments of other fish bones. Several small, broken catfish spines were present. Probably all the fish remains were of catfish. Also present were limb bones possibly of small frogs but more likely of tadpoles, large ones verging on transformation. (These remains are not included in Table 15.) Five crayfish statoliths were found, and many bits of crushed snail shell. This mass almost surely represents the stomach contents of an alligator, probably one about four or five feet in length. Alligators of this size commonly forage on a stream or lake bottom, subsisting mainly upon snails, crayfishes, tadpoles, and catfishes. While catching their pray, the reptiles often swallow much sand and clay. The gizzard-like stomach of the alligator, aided by ingested sand and gravel, soon pulverizes the snail shells and fish bones. Similar masses are often seen about the shellheaps; their existence suggests that the Indians cleaned the alligators before cooking them.

It is perhaps significant that the only snake remains are those of large diamondback rattlesnakes. It will be recalled that today the diamondback is unique among serpents in being canned as a delicacy. It is the only snake of peninsular Florida that yields a large amount of palatable meat. Other sizable snakes are much less meaty and somewhat less flavorsome. It therefore seems likely that the Indians gathered the rattlesnakes to eat. The absence of smaller individuals and of less palatable species again suggests an abundant food supply.

The diamondback rattlesnake is most characteristic of dry, sandy hills, where it is easily discovered. However, occasional individuals wander into the river swamps, especially during the summer. The relatively small quantity of rattlesnake remains is in accord with the supposition that the Indians hunted mostly along the river. Diamondbacks occur today in the vicinity of all the sites.

Diamondbacks from the Florida Pleistocene differ from modern ones; and another species of rattlesnake, allied to the diamondback, also existed in Florida during Pleistocene times (Brattstrom 1954). Diamondback remains from the shellheaps consist only of vertebrae; these are indistinguishable from the vertebrae of presentday specimens. The Pleistocene diamondbacks are distinguished from the modern ones on the basis of vertebral characters; consequently the rattlesnake remains from the middens confirm a post-Pleistocene dating for the sites.

Birds. Remains included 24 species (Table 16), all of them occurring in the vicinity of the sites at the present time. The most abundant species was the wild turkey, which frequents river swamp as well as drier habitats. Four species of raptorial or scavenging birds are represented by a single specimen each; these are the turkey vulture, red-tailed hawk, bald eagle, and fish crow. Possibly they were attracted by the refuse about the middens. The remaining species are all aquatic, and bear out the view that the Indians were hunting mainly along the stream or in river swamp.

Most of the birds from the middens are still eaten today, although some (particularly the loon, grebe, cormorant, and vulture) are not considered palatable by white men. Of course, some of the birds may have been collected for purposes other than culinary ones.

The list of birds gives some evidence as to the time of year that the sites were occupied by the Indians. Twelve of the species occur here today only in the winter time, after summering in the northern states or in Canada. These are the common loon, mallard, black duck, pintail, gadwall, lesser scaup duck, ringnecked duck, bufflehead, ruddy duck, hooded merganser, bald eagle, and American coot. The presence of these birds indicates that all 4 sites were occupied during the winter months.

Four species, the great blue heron, greater egret, turkey vulture, and limpkin, are represented in the midden material from Good's Shellpit or Lemon Bluff by juvenile individuals. In Florida the main egg-laying period of these birds is March and April. Since the bones are from individuals of a few months' age, the young birds probably were killed during the summer. Coupled with the presence of winter

visitants, this circumstance indicates that the Indians made use of these 2 sites, at least, during all seasons of the year.

The age of the sites may be considered not only from an archaeological standpoint, but from the evidence afforded by bird remains. No extinct species of bird has been found in the middens. This in itself does not mean a great deal, however, since the majority of birds composing the Pleistocene avifauna are still living today. The complete ulna of a coot from Good's Shellpit gives some evidence for a post-Pleistocene dating of the site. The Pleistocene coot has been taxonomically separated from the modern bird on the basis of shorter wings (Howard 1946: 182-3). The Good's Shellpit

SPECIES	VO 135	VO 61	VO 22	LA 2	TOTAL
COMMON LOON, GAVIA IMMER	2/1	0/0	0/0	0/0	2/1
PIED-BILLED GREBE, PODILYMBUS PODICEPS	2/1	2/1	1/1	1/1	6/4
DOUBLE-CRESTED CORMORANT, PHALACROCORAX AURITUS	11/2	4/1	1/1	0/0	16/4
ANHINGA, ANHINGA ANHINGA	0/0	1/1	0/0	0/0	1/1
GREAT BLUE HERON, ARDEA HERODIAS	3/1	1/1	0/0	0/0	4/2
GREATER EGRET, CASMERODIUS ALBUS	3/1	5/2	0/0	0/0	8/3
MALLARD, ANAS PLATYRHYNCHOS	0/0	2/2	1/1	0/0	3/3
BLACK DUCK, ANAS RUBRIPES	1/1	0/0	1/1	0/0	2/2
PINTAIL, ANAS ACUTA	0/0	0/0	1/1	0/0	1/1
GADWALL, ANAS STREPERA	0/0	0/0	1/1	0/0	1/1
LESSER SCAUP DUCK, AYTHYA AFFINIS	5/1	4/1	1/1	0/0	10/3
RING-NECKED DUCK, AYTHYA COLLARIS	2/1	0/0	3/1	0/0	5/2
BUFFLEHEAD, BUCEPHALA ALBEOLA	0/0	3/1	0/0	0/0	3/1
RUDDY DUCK, OXYURA JAMAICENSIS	3/1	3/2	0/0	0/0	6/3
HOODED MERGANSER, LOPHODYTES CUCULLATUS	4/2	1/1	0/0	0/0	5/3
TURKEY VULTURE, CATHARTES AURA	1/1	0/0	0/0	0/0	1/1
RED-TAILED HAWK, BUTEO JAMAICENSIS	1/1	0/0	0/0	0/0	1/1
BALD EAGLE, HALIAEETUS LEUCOCEPHALUS	0/0	0/0	0/0	1/1	1/1
WILD TURKEY, MELEAGRIS GALLOPAVO	23/5	4/1	2/1	1/1	30/8
SANDHILL CRANE, GRUS CANADENSIS	0/0	1/1	0/0	0/0	1/1
LIMPKIN, ARAMUS GUARAUNA	1/1	0/0	0/0	0/0	1/1
PURPLE GALLINULE, PORPHYRULA MARTINICA	1/1	0/0	0/0	0/0	1/1
AMERICAN COOT, FULICA AMERICANA AMERICANA	2/1	2/1	3/2	0/0	7/4
FISH CROW, CORVUS OSSIFRAGUS	0/0	0/0	1/1	0/0	1/1

TABLE 16. Birds. Total number of bones, followed by minimum number of individuals represented.

specimen is dark in color but not heavily mineralized; its length is 65.0 mm., which exceeds the maximum of the Pleistocene coot and falls within the range of the modern bird. The complete humerus of a coot from Bluffton measures 73.0 mm.; it likewise exceeds the maximum for the fossil race and falls within the range of the modern one.

Four turkey bones from Good's Shellpit are heavily mineralized, resembling in this respect Pleistocene fossils from lake-bottom deposits in the region. The 4 specimens are not necessarily of Pleistocene age, however, for under certain conditions mineralization in Florida seems to take place at a comparatively rapid rate. A few of the turkey bones, heavily mineralized and otherwise, show evidence of fire.

The only worked bird bone is a section, 45 mm. in length, from the shaft of a turkey humerus. Both ends of the humerus have been cut off at right angles to the shaft.

Mammals. Remains from Good's Shellpit and Lemon Bluff are listed in Table 17. As mentioned previously, the number of deer bones is somewhat less than the quantity actually encountered. Mammal bones from the other 2 sites have not been tabulated; they do not add to the list of species.

In general, bones of smaller mammals are apt to be entire, those of the larger ones split or broken, presumably for the marrow.

Rabbit remains probably are those of the marsh rabbit, *Sylvilagus palustris*, and of the cottontail, *S. floridanus*; but precise identification is not possible.

The white-tailed deer was preyed upon by the Indians more often than any other mammalian species. Deer bones include numerous jaws, antler fragments, and pieces of skull as well as limbs, girdles, and vertebrae. Apparently the animals were brought to the site whole. Cannon bones are few as compared with other deer bones, and the ones found fre-

SPECIES	VO 135	VO 61	TOTAL
NORTH AMERICAN OPOSSUM, DIDELPHIS VIRGINIANA	47/8	8/5	55/13
RABBITS, SYLVILAGUS SPECIES	17/3	5/2	22/5
GRAY SQUIRREL, SCIURUS CAROLINENSIS	2/1	1/1	3/?
WOOD RAT, NEOTOMA FLORIDANA	3/2	0/0	3/2
DOG, CANIS FAMILIARIS (LARGE VARIETY)	4/1	0/0	4/1
DOG, CANIS FAMILIARIS (SMALL VARIETY)	5/2	2/1	7/3
GRAY FOX, UROCYON CINEREOARGENTEUS	1/1	0/0	1/1
BLACK BEAR, EUARCTOS CF. FLORIDANUS	0/0	1/1	1/1
RACCOON, PROCYON LOTOR	84/12	27/11	111/23
OTTER, LUTRA CANADENSIS	16/3	2/1	18/4
BOBCAT, LYNX RUFUS	12/3	4/2	16/5
PUMA, FELIS CONCOLOR	0/0	1/1	1/1
WHITE-TAILED DEER, ODOCOILEUS VIRGINIANUS	247/15	92/7	339/22

TABLE 17. Mammals. Total number of bones, followed by minimum number of individuals represented.

quently had been cut by some edged tool. Presumably the deer cannon bone was the main one used in the manufacture of awls and other implements.

The second most common mammal is the raccoon. Raccoons are still very abundant in this part of Florida. However, they are largely nocturnal; and, being generally arboreal by day, they could not be easily secured by atlatl and dart (presumably the weapon of the preceramic Indian). Conceivably the Indians hunted raccoons with the aid of dogs, or perhaps the animals were trapped. The refuse heaps of the Indians would possibly have attracted raccoons from the nearby swamps; no doubt they would have attracted opossums, which were collected in goodly numbers.

It will be noted that 2 varieties of dog occur, a large and a small. Dog remains are fragmentary like those of game animals.

Feces, thought to be of dog, were noted at Good's Shellpit, Bluffton, and Lemon Bluff. A coprolite from the last locality contained fish scales. Droppings are sometimes well preserved in the shellheaps. The absence of human feces is perhaps noteworthy, as indicating a certain degree of sanitation.

The occurrence of wood rat remains is interesting. The present distribution of the wood rat in this part of Florida is spotty; it is apparently lacking from certain areas for no obvious reason. It does occur along the St. Johns drainage in the vicinity of the sites, building great nests of sticks in the river swamp and on islands in the larger spring runs. These nests are easily located and the rats run out. Although the wood rat is not eaten today, it is said by naturalists to be savory, the equal of rabbit or squirrel.

Mammal remains found at the sites are mostly those of species still occurring in the area. The puma has become well-nigh extinct in recent years, and the Indian dogs have been replaced by other varieties.

Most of the larger mammals range through several plant associations in Central Florida, and so are not particularly good indicators of habitat. The otter and wood rat, however, are especially characteristic of river swamp in this area. The raccoon is also essentially a species of the river swamp, although occurring in flatwoods and other habitats. The opossum dwells mainly in and about the border of river swamp, as well as in mesic hammock,* pine flatwoods, and open woods generally. The gray fox inhabits almost any brushy area, especially turkey oak and longleaf pine. The gray squirrel is mostly confined to river swamp, mesic hammock, and live-oak hammock. The white-tailed deer and Florida black bear are today most common in river swamp and rosemary scrub; the bobcat frequents river swamp, flatwoods, and other areas. The few puma remaining in the area inhabit river swamp, mesic hammock, and rosemary scrub. The assemblage of mammal remains is one that might be expected if the Indians hunted largely along the river and adjacent swampland, with but occasional ventures into drier habitats.

It is of interest to consider the Central Florida mammals that are lacking from the midden material. The absence of very small animals, such as moles, shrews, bats, smaller rats, and mice, is not surprising. The pocket gopher, *Geomys pinetis*, and the weasel, *Mustela frenata*, are somewhat larger but quite difficult to secure by primitive means. The spotted skunk, *Spilogale ambarvalis*, and the striped skunk, *Mephitis mephitis*, occur today in the vicinity of the sites. The latter species is common, and could be killed easily by primitive weapons. Evidently the Indians did not often bring these odoriferous animals to the village sites, however.

The fox squirrel, *Sciurus niger*, a fair-sized and edible species, was not represented in the midden material, although now common in the area. It is diurnal and not especially difficult to approach. However, in this portion of Florida it is now largely confined to the dry sandhills, and very rarely occurs in the river swamp and the hammocks where the gray squirrel is found. The absence of the fox squirrel, and the presence of its smaller ally, the gray squirrel, help to confirm the supposition that the Indians hunted mostly along the stream.

The round-tailed water rat, *Neofiber alleni*, was lacking. It, too, is a fairsized, edible species,

* EDITOR'S NOTE: "Mesic" signifies an intermediate degree of moisture, neither swampy nor especially dry. Mesic forest is the climax vegetation of central Florida, characterized by magnolia, American holly, and various oaks, hickories, and maples. This type of forest generally occurs in isolated stands, locally known as "hammocks."

and one not too difficult to collect. However, in this area it inhabits ponds and grassy, freshwater marshes, avoiding river swamp. Thus its absence is in accord with expectations.

The manatee, *Trichechus manatus*, today occurs in Lake George, and has been reported elsewhere in the St. Johns River drainage. The lack of manatee remains perhaps reflects the difficulty of killing this huge, powerful, aquatic animal, which makes for deep water when disturbed.

The absence of the wolf, *Canis niger*, is not especially remarkable, for the larger carnivores evidently were not often collected by the Indians.

For some unknown reason the mink, *Mustela vison*, today is absent from the vicinity of the sites, although occurring both to the north and to the south. Its similar absence from the midden material is therefore of interest. An aquatic species and somewhat otter-like in habits, it probably would have been collected had it been present.

The absence of the beaver, *Castor canadensis*, is noteworthy. The species is lacking from this part of Florida today, but has been reported from certain archaeological sites in the general region. At the Palmer-Taylor site, Seminole County, beaver remains occurred in what appeared to be a late preceramic context (Rouse 1951: 122); and 3 beaver jaws have been found at the "Du Barry" (deBary) Creek site, Volusia County, a midden perhaps of St. Johns II times. At South Indian Field, Brevard County, a jaw was discovered in association with fiber-tempered pottery (Rouse 1951: 83); and a cache of 7 jaws, minus the incisors, were found within a radius of 12 inches in one of the "wells" at this site (personal communication, A. T. Anderson). A beaver molar was found in an "Indian mound" (probably a midden) on the Indian River (Allen 1942: 66). There are also some "Pleistocene" records, based on mineralized remains from stream bottoms. Today the species ranges no farther south than the Apalachicola and Choctawhatchee drainages of northwestern Florida. Further study is needed to determine just when the beaver extended its range into peninsular Florida.

Worked Bone and Horn. Preceramic levels of the shellheaps yielded a variety of bone and horn implements. Bone awls of the splinter variety, long bone points, bone and horn "punches," cut mammal bone, and cut deer antler were noted at one or more of the sites. The markings on cut bone and horn suggest that the cutting tool was applied with force in a sawing motion.

Most utilized bones appear to be those of deer. One turkey bone had been worked, as noted previously.

Artifacts will not be described in detail, but a few noteworthy finds may be mentioned. Both Good's Shellpit and Lemon Bluff produced bone artifacts resembling stemmed projectile points (Gut and Neill 1953). The former site also yielded a number of deer phalanges, ground flat on one end and perforated longitudinally. A similar specimen, illustrated by Wyman (1868, Fig. 7), was found in the preceramic portion of a midden on the St. Johns River.

An interesting bit of incised bone was collected at Bluffton. It is the radius and ulna of a deer, pathologically fused by a hard, heavy growth of bone. The abnormal growth had been neatly incised with an edged tool, as though in an attempt to remedy the pathological condition.

Mineralized Remains of Extinct Animals. As stated previously, the Bluffton site was examined by a number of archaeologists. Among the material recovered by them were a few heavily mineralized remains of extinct animals. These are now in the Florida State Museum. The mineralized remains include the scute of an extinct giant armadillo, *Holmesina septentrionale*, from the "deep" (preceramic) portion of the site; the carapace fragments of an extinct turtle, *Pseudemys* (*Trachemys*) cf. *sculpta*, from a preceramic level 12 feet below the original midden surface. These bones are immediately distinguishable from other midden remains by virtue of their complete mineralization and very dark coloration. They are far more heavily mineralized than all the other bones found with and below them. Even remains from the deepest levels of the site, well below the present water table, are not mineralized to so great a degree. Clearly the specimens of *Holmesina* and *Trachemys* were already fossilized when brought to the site by the Indians, and are not remains of contemporary animals that were preyed upon. Addi-

tional support of this view is found in the occurrence of a *Trachemys* bone in an upper, pottery-bearing level of the Bluffton site.

The bottom of the St. Johns River and its tributaries yields mineralized remains of Pleistocene and earlier organisms (Gut 1939). Sometimes these may be discovered by wading or grubbing about in the mud. The Indians, searching for mollusks, would have been very apt to find these fossils, and perhaps to have brought them to their villages. At the 4 sites studied, there is no evidence that the Archaic peoples were actually in contact with any of the so-called Pleistocene species that are now extinct. In this connection, one of the authors (Gut) has collected vertebrate remains from numerous middens on the St. Johns River drainage and found no evidence of extinct Pleistocene mammals, except for one fragment of a mammoth tooth which was doubtless fossilized when picked up by an Indian.

Miscellaneous. Fish bones were found at all of the sites, but most of them were not identified. Numerous catfish spines were collected; very large ones are probably those of the channel catfish, *Ictalurus lacustris*, which today is common in the area.

The middens are composed largely of freshwater mollusk shells, among which *Paludina*, *Pomacea* (also called *Ampullaria*), and *Unio* predominate in about that order of frequency. A few shells of other species occur, but comprise a negligible fraction of the total. The 3 most abundant shells are not always distributed randomly throughout the middens. Rather, a vertical profile may reveal some wide bands of *Paludina*, unmixed or with a few *Pomacea* and *Unio*; narrow or moderately wide bands and lenses of *Pomacea*; and usually narrow bands or lenses of *Unio*. In the area today, the three mollusks are not distributed randomly; *Paludina* is abundant in a number of aquatic situations, *Pomacea* is of frequent occurrence in some streams and lakes but scarce or lacking in others, while *Unio* is really common only in a few restricted areas. Probably, the Indians would deplete the supply of mollusks along one stretch of lake shore or stream, and so find it necessary for a time to collect their shellfish from some other area in the general vicinity.

In contrast with later horizons, the preceramic levels of the shell heaps yield few tools of imported marine shell. Fragments of *Busycon* shell were noted at all the sites, and a *Busycon* gouge at Lemon Bluff. One valve of a large oyster shell was recovered from Lemon Bluff and another from Bluffton. A valve of a small ark shell, *Arca*, was found at Silver Glen Springs. Apparently these preceramic Indians were obtaining just a few marine shells, possibly for tools or ornaments. None of the sites is more than 40 miles inland from the Atlantic Ocean.

It may be mentioned that at times of low water, marine shells of Pliocene age are exposed in places along the St. Johns River; and at some localities in this vicinity, old marine formations, with well-preserved shells, lie very near the surface of the ground. Thus the Indians could have obtained marine shells without trading for them or visiting the seashore.

A few fragments of turtle shell from Good's Shellpit, Lemon Bluff, and Bluffton had been gnawed by mice. One fragment had been gnawed completely around its periphery, and could have been mistaken for an artifact. The refuse heaps of the Indians included animal viscera, bones, turtle shell, dog droppings, and the like, as well as mollusk shells; like modern garbage dumps, they must have attracted vermin, such as mice and insects, as well as certain scavenging birds and animals.

Intersite Comparisons. The lowest levels of the sites are below the present water table. Presumably, then, there has been a rise of ground-water level since Archaic times. The likelihood of this has been discussed by Goggin (1948: 227-8) on the basis of studies at other sites. Since the Bluffton midden extends to the greatest depth below water table, it may have been occupied from a somewhat earlier time than the other three.

The vertebrate remains from Bluffton, and more particularly from Silver Glen Springs, are few in number as compared with those from Lemon Bluff and Good's Shellpit. This situation merely reflects the methods of collecting, however. The only remains to be tabulated from Silver Glen Springs were those found in situ by single-handed excavations, and those from Bluffton were likewise recovered from test cuts; but the bones from Good's Shellpit and Lemon Bluff were collected over a period of years as commercial activities stripped away successive layers of shell from the preceramic levels. Good's Shellpit received special attention.

Discussion and Summary. Goggin (1948: 232) stated, "[The archaeologist] has found from experience that few naturalists are . . . even interested in identifying zoological material. . . ." This situation is unfortunate. Valuable biological data can be gleaned from the animal remains uncovered at Indian sites, as pointed out long ago by Wintemberg (1919) and recently by Gilmore (1949). Goggin remarked at the same time that the archaeologist "whose interest is usually only cultural history is loath to collect all animal material. . . . However, if given any encouragement he will probably be found eager to cooperate in collecting non-cultural material, for the archaeological awareness of their value is growing." In this connection a few suggestions might be offered, supplementing those of Gilmore (1946).

Identification of remains should be attempted only by a specialist in the taxonomy or anatomy of the animal groups involved. Some taxonomists are concerned also with the ecology of the animals they study, and so might be able to comment trenchantly on the environmental conditions that prevailed when a given site was occupied.

Stratigraphy and chronology are as important biologically as archaeologically; in fact, animal remains from Indian sites are apt to be especially interesting to zoologists because they can be dated with fair accuracy.

Some archaeological reports list the species of animals found, but not the numbers of each; yet valuable inferences can often be drawn from the abundance of one species as compared with that of another. Of course, it is often of interest to compare the abundance of remains at one stratigraphic level with that at another level.

Site reports seldom give precise identification of the fish, amphibian, reptile, and bird remains; customarily only the mammals are identified to species. But mammals, at least the larger ones, are apt to be only fair indicators of habitat; whereas some of the lower vertebrates cannot exist outside certain ecological situations, and consequently give a better idea of the environmental conditions that prevailed near the sites. Especially undesirable is the custom of lumping all turtle remains simply as "turtles." Such remains generally can be identified to the level of species; and the identification is worth the effort, for the individual species may differ greatly in their habitat requirements. Molluscan remains hold possibility, also.

Many archaeological traits, ignored by early workers as meaningless, are today of considerable significance. Modern archaeologists should not ignore animal remains simply because these cannot always be analyzed conveniently at the present time.

Both biologists and archaeologists are concerned with environmental changes during past millennia, and could profitably cooperate in attacking many facets of the problem. The latter workers would profit doubly, for they would learn a great deal about the subsistence activities of primitive man.

In the present study, certain significant conclusions have been drawn from animal remains found at 4 preceramic sites in the northern St. Johns area of Florida.

1. The midden remains include at least 47 species of vertebrates, every one of which occurs in the vicinity of the sites today. In this part of Florida, the vertebrate fauna of the preceramic Archaic, so far as is known, was virtually identical with the modern one, apparently even to certain minutiae of distribution. This circumstance implies a close similarity of environmental conditions as well. The vegetation of the region seems to have been diversified in preceramic times, much as at present. Not only river swamp but some dry, sandy areas, probably of rosemary scrub or of turkey oak and longleaf pine, existed in the vicinity of the sites, and there may well have been pine flatwoods and mesic hammock also. There is no indication that these Indians were in contact with the extinct, so-called Pleistocene species; nor is there evidence that deer, turtles, alligators, or other species reached a greater size in Archaic times than at present.

2. Remains of the American coot and eastern diamondback rattlesnake confirm a post-Pleistocene dating for the sites.

3. The midden material is especially rich in the remains of species inhabiting streams and river swamp. Apparently the Indians hunted largely along the river and its tributaries, and seldom in the drier habitats. This is not surprising, for they lived in the swamp, on the stream or lake shore, and must have spent a great deal of time in and about the water in order to collect the mollusks whose

shells compose the middens. The refuse heaps may have attracted some game, as well as vermin. Most of the hunting probably was carried on by day. It seems unlikely that these Indians were given to staging fire drives, their food animals being mostly those of the water and the damper habitats. Indeed, there is little evidence that any specialized hunting technic was employed, beyond that of prowling the river swamp and collecting any fair-sized, edible game that might come within reach.

4. Bird remains reveal that the Indians occupied at least two of the sites both in winter and in summer.

5. These Indians preyed most heavily upon the white-tailed deer, raccoon, opossum, wild turkey, soft-shelled turtle, and 2 terrapins; and somewhat less heavily upon the otter, bobcat, rabbits, double-crested cormorant, alligator, gopher tortoise, and eastern diamondback rattlesnake. Various other mammals, birds (especially water fowl), turtles, and a bullfrog were hunted sparingly. In general, these Indians did not collect small animals, odoriferous ones, or smaller individuals of the larger species; rather, they devoted their attention to meatier and more flavorsome game. Presumably, then, they did not suffer from any shortage of food. They did not often prey upon the larger carnivores, such as the black bear and the puma; they did collect very large alligators, however.

6. Deer carcasses were brought to the site entire. Terrapins and soft-shelled turtles were beheaded when caught. Turtles were gathered mostly for culinary purposes. These reptiles were dressed, and alligators were at least cleaned. In most cases, turtle shells were broken by pounding, but box turtles were opened by a special technic which took advantage of their peculiar shell construction.

7. These preceramic people kept 2 varieties of dog, one large and one small. The dogs probably were eaten, as their remains are fragmentary like those of game animals.

8. Considerable use was made of bone and antler. Most of the worked or incised bone appears to be that of deer, although one artifact of turkey bone was found. The deer cannon bone, especially, was employed in the manufacture of implements. A pathological deer bone, consisting of a fused radius and ulna, had been incised as though to correct the abnormal fusion. Marine shells were not often obtained, although a few occurred at the sites. These could have been obtained from Pliocene formations rather than from the seashore.

9. Thoroughly mineralized remains of extinct animals are often found on stream and lake bottoms in the St. Johns River drainage. These remains may sometimes be discovered by wading or grubbing in the mud, and are thus likely to have been encountered by Indians who were gathering shellfish. The occasional presence of such remains in the middens is therefore of little significance.

10. The middens are composed largely of 2 snails, *Paludina* and *Pomacea*, and a clam, *Unio*. These mollusks are not distributed uniformly over the area today, nor do their shells occur randomly in the middens. It is probable that the Indians, having depleted a local supply of, say, *Paludina* and *Pomacea*, might turn their attention to another nearby area, where *Unio* chanced to predominate.

11. There were no important intersite differences in faunal composition.

12. The midden remains yielded certain other interesting data which, being purely zoological, need not be summarized here.

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FACTS AND COMMENTS

A SMALL IRRIGATION SYSTEM IN THE VALLEY OF TEOTIHUACAN

Examination of aerial photographs of the Teotihuacan region for indications of abandoned irrigation canals revealed the traces of a small system just to the northwest of the modern road connecting the town of Atlatongo with the ceremonial center of Teotihuacan. The system lies along a stream flowing southeastwards in the tributary valley formed by Cerros Maravillas to the west, Tenextlacotla to the north, and Malinalco to the east (Fig. 123). The aerial photograph used had a scale of 1:10,000. It was taken by the Compañía Mexicana de Aerofoto and is identifiable as Sheet 50 of the aerial survey "Cuautitlán to Estación de Irolo" (Fig. 124). Although the photograph was not taken for archaeological purposes, its utility in locating remains on the ground demonstrates once again that the systematic use of aerial photographs in settlement archaeology — used to such advantage elsewhere — could also yield promising results in Mesoamerica.

The remains of the system identified on the ground are: a large earth storage dam; a small earth diversion dam; remains of works intended to dam back the water to the level of a canal intake; and an irrigation canal.

The large dam crosses the valley from east to west, at the point where 2 streams merge into one, and where their waters could accumulate in a permanent storage basin. The dam is 530 m. long, 11 m. high at its highest point, 7 m. wide at its widest. A masonry structure which once contained a sliding gate is inserted into the earth dam where it crosses the stream. The dam itself may be pre-Hispanic in origin; the gateway and its masonry supports are clearly colonial in manner of construction. Thick layers of stratified deposits rise almost to a level with the top of the masonry insert on the upstream face of the dam. This may indicate that the irrigation system was abandoned when the storage basin silted up. The water then cut a deep trench through the dam, and opened a gap at the western closure between earth dam and masonry insert. This end of the insert is undermined and abraded by water action (Fig. 125 *a*).

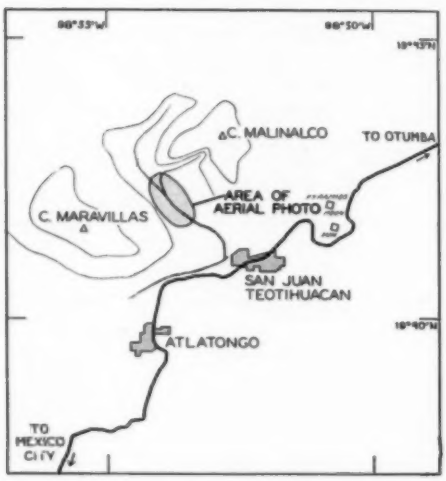

FIG. 123. Sketch map of the Teotihuacan area, showing approximate position of irrigation system. Scale approximately 1:100,000. Prepared by Nancy Engle.

About 250 m. downstream from the big dam we found a smaller earth dam which served to divert the water of the stream towards the western slope of the valley. The aerial photograph shows that the stream once followed the natural fall line through the center of the valley. This old bed is now almost completely obliterated through sedimentation; all that is visible on the ground today — for the most part — is a slight concave depression. Only where the main path through the valley meets a path coming up from the modern road can one still see the original banks of the water course. Local informants claim that the small dam was built only a few years ago to keep the stream from breaking into the fields in the center of the valley during the rainy season. It is more than probable, however, that they merely rebuilt an already existing structure. Examination of the aerial photographs and inspection of the terrain make it likely that the diversion is very old. Only a man-made obstacle of some antiquity can account for the present course of the stream. Moreover, the canal intake found about 600 m. below the small diversion dam is predicated on effective diversion of the stream to the western flank of the valley and would be meaningless without it.

Close below the canal intake we encountered a third set of remains. Here 2 parallel lines of round holes dug into the bedrock 1.65 m. apart cross the stream diagonally. The average diameter of each hole is 35 cms.; the distance from center to center of holes in the same line between 1.20 to 1.25 m. The holes form a regular zigzag pattern. Although erosion has destroyed some of them, a count yielded between 22 and 25 holes in each line. The pattern suggests postholes which once contained upright posts, the framework for a small dam about 25 m. in length (Fig. 125 *b*).

Historical and ethnographic evidence allows some reconstruction of the way such small dams were built. In 1433, Tecocohuatzin of Cuauhtitlán forced the defeated Tepanecs of Toltitlán to divert the river which flowed through Cuauhtitlán

> at the point where it was called Tepolnexco . . . they dammed it up with poles, not set crosswide but upright and close together. They buried the poles close to the canal so that it was completely blocked, and thus the water changed its course and shifted its bed . . . (Anales de Cuauhtitlán 1945: 49).

FIG. 124. Aerial view showing: *a*, big earth dam; *b*, small diversion dam; *c*, former river bed; *d*, abandoned canal. Courtesy of Compañía Mexicana de Aerofoto.

FIG. 125. Evidence of irrigation system near Teotihuacan: *a*, breach between earth dam and masonry insert; *b*, lines of postholes, indicating former existence of small dam used to raise water to level of canal intake.

Some Mexican Indian groups continue to use this construction technic today. In January, 1949, Pedro Armillas observed and photographed a canal intake built in this fashion to divert water from the Tlapaneco River at Tlapa, Guerrero. An improvised dam, built diagonally into the stream by heaping up stones, served to draw off some of the river water into a canal intake (Fig. 126 *a*). Earth and branches, reinforced by vertical poles, lined one of the sides of this canal (Fig. 126 *b*).

The pattern of the Atlatongo system suggests that the small dam there was built in the same way. Two lines of posts probably supported a lattice work of branches, with the interval between the walls thus formed filled with earth and stones. The dam apparently served to block the stream just enough to lift its water to the level of the canal intake, located about 30 m. upstream. The remains of the intake consist of the bottom of a canal about 1.50 m. wide, cut into bedrock, and paralleled on its down-valley side by another line of round holes (Fig. 127). These holes measure between 12 and 18 cms. in diameter; the distance from center to center between 60 and 68 cms. The pattern suggests a barrier of vertical posts, branches and earth fill similar to the one observed at Tlapa. This intake canal fed into a longer canal. Its traces, hardly visible on the ground, can be seen clearly in the aerial photograph, which indicates that the canal bed ran for about 750 m. in a south-southwesterly direction. During the wet season, in August, when we traced the system on the ground, the maize in the old bed was taller and greener than the maize to either side of it. The line thus formed was clearly visible from the hill to the northwest of the

FIG. 126. Irrigation along the Tlapaneco River, near Tlapa, Guerrero: *a*, improvised canal intake; *b*, earth dam reinforced with poles and branches.

FIG. 127. Canal intake, with line of postholes on down-valley side, near Atlatongo.

canal intake. Beyond the area covered by the photograph it seemed to veer further to the southwest.

The location of the system in the Valley of Teotihuacan, and the character of construction technics used inevitably raise the question of when the system was constructed. There is some historical evidence for pre-Hispanic irrigation in the Valley of Teotihuacan. King Netzahualcoyotl of Texcoco tapped springs at Teotihuacan to irrigate the Texcoco area (Pomar 1941: 53). A unified irrigation system for Teotihuacan, Acolman, Tepexpan, and Tecciztlan is mentioned in a report written in 1580, but the accompanying map shows only the larger canals and ignores our small system (Paso y Troncoso 1905, Vol. 6: 220; map between pp. 208-9). The anonymous *Suma de Visitas*, written in the middle of the 16th century, reports "some irrigation" for Teotihuacan under the name of Gueytihuacan (Paso y Troncoso 1905, Vol. 1: 113). The small system described here, however, does not appear in any of the readily available sources.

At the same time, abundant remains of pre-Hispanic occupation cover the western slope of the valley, close to both dams and canals. From the slope of the hill to the northwest of the canal intake comes pottery of the Tenochtitlan Black-on-orange type (formerly Aztec III). The locality yields large numbers of sherds of utilitarian ware, as well as grinding stones (manos) and splinters of obsidian tools. Remains of sherds and implements are also found in the flat to the north of this hill and extend up to the great earth dam. There identifiable pottery is almost wholly of the Tenayuca Black-on-orange (formerly Aztec II) type; one sherd of Tenochtitlan Black-on-orange was also found. Up to the time of writing no indication of pottery older than Tenayuca Black-on-orange has come to light in the area surrounding the irrigation system. If some connection exists between the large dam and the village immediately to the west of it, the system here described may well date from the 15th century. As such it would seem to be roughly coeval with the irrigation system surveyed by Angel Palerm and Eric R. Wolf in the Texcoco area (1954), and may similarly have been built in response to the growing food crisis threatening the Valley of Mexico at midcentury. The technics employed in its construction may, however, be older than the system itself. Only further research can determine their wider distribution in time and space. Evidence for their presence in other areas — the area of the Hohokam, for instance — could add considerably to our understanding of prehistoric cultural relationships in America.

ANALES DE CUAUHTITLÁN

1945 *Códice Chimalpopoca*. Imprenta Universitaria, Mexico.

PALERM, ANGEL AND E. R. WOLF

1954 A Preliminary Survey of an Irrigation System near Texcoco, Mexico. (Paper presented at the 53rd Annual Meeting of the American Anthropological Association, December 30, 1954.)

PASO Y TRONCOSO, FRANCISCO DEL (EDITOR)

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A NEW EARTH-SHAKING MACHINE

In the fall of 1954 the undersigned had occasion to investigate the discovery of an eastern fluted projectile point in an excavation being made for the erection of a flagpole memorial to the man who originated the Tadpole Club. In preparation for this expedition to a Boy Scout camp near the Delaware Water Gap we decided to build a motor-driven sifter. This machine has operated so well on this and succeeding trips that it seems to warrant a brief description.

The accompaning sketch (Fig. 128) shows the basic principles. The screen, mounted at a slant on ¼-inch thick plywood legs, is free to move back and forth due to the flexibility of the plywood. A little experimentation demonstrated that about 150 strokes was right for most sifting operations. Therefore the pulleys of the driving unit were made to proper sizes to give this

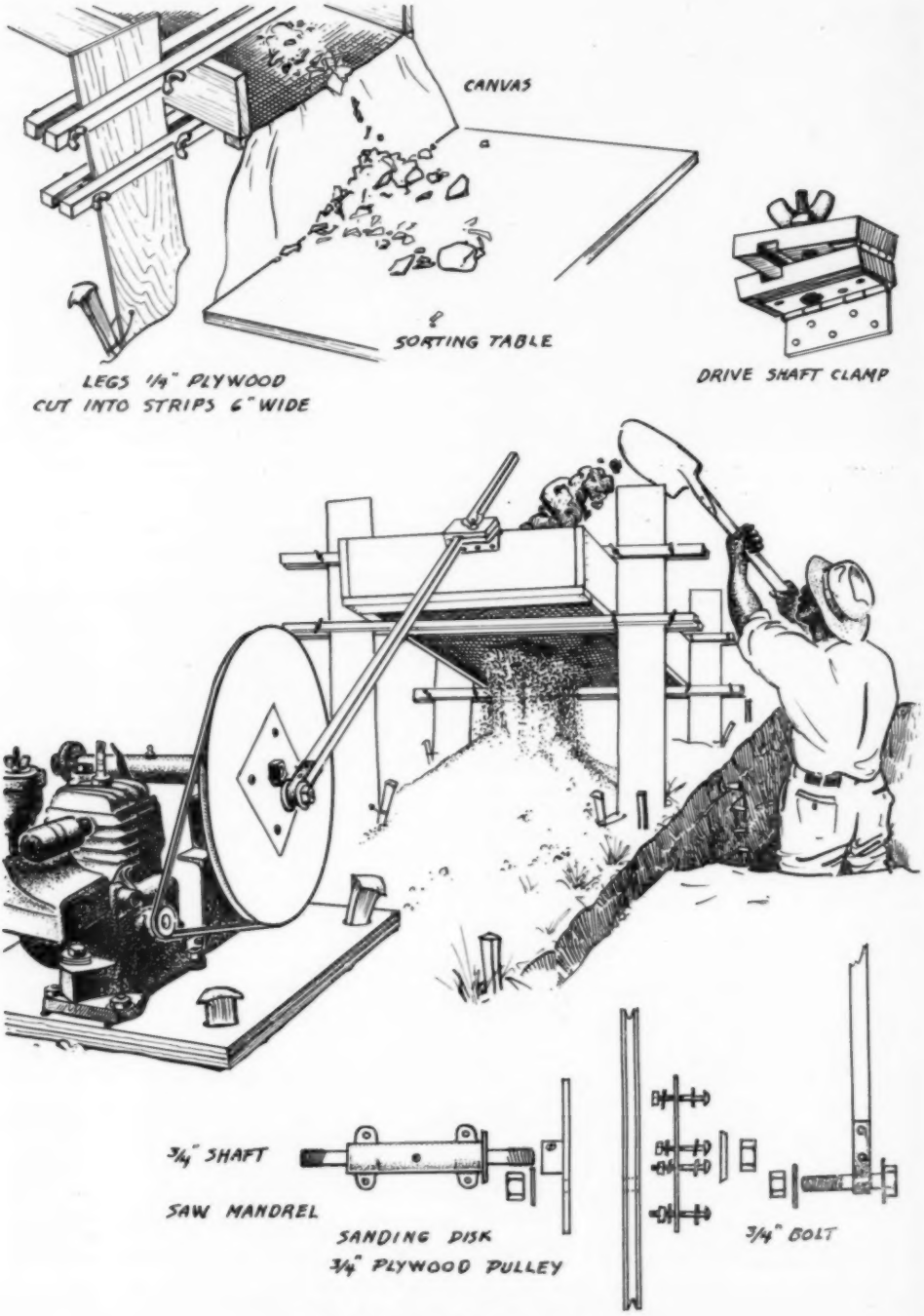

FIG. 128. The Bird-Ford earth shaker.

effect at normal engine speed. For the ¾ horsepower single-cylinder 4-cycle engine we used, the driving pulley was 2 inches in diameter and the big reduction pulley 21 inches in diameter. The reduction pulley was turned from ¾-inch plywood, bolted to a sanding disk, which in turn was fastened to a medium-sized saw mandrel. Both saw mandrel and engine were mounted on a small sturdy plywood base and the pulleys connected by a 72-inch V-belt as shown. Slots for the engine hold-down bolts allowed the belt to be tightened as necessary.

The drive rod was a 1 by 1 inch piece of hickory 12 feet long. At the engine end a simple bearing was made from narrow strap iron that attached the rod to a ¾-inch diameter bolt fastened 2½ inches off center of the large plywood reduction pulley. This gave the drive rod, and consequently the screen, a 5-inch back and forth movement. A wooden clamp fastened to the back of the screen by a large hinge received the other end of the drive rod. This device made it unnecessary to place the engine unit any particular distance from the screen for the drive rod could be clamped at any point along its length.

Field operation is simple. Usually we have taken along the power unit, drive rod, and clamp, and have constructed the screens locally. Three by 8 feet is the usual size and the frames are made of 1 by 6 white pine, well braced with angle irons at the corners. The legs, engine base ,and plywood pulley should be painted to protect the plywood from dampness; fire-engine red is recommended. Metal hardware cloth of the size known as 3 by 3 (3 openings to the inch) seems to be the most convenient size. This is hard to procure in rural hardware stores and an extra supply should be taken along, to repair holes as the screening wears out.

In use the screen is set parallel to the excavation unit and pegs are driven through wire loops attached to the ends of the legs to prevent them from "walking." The engine unit is placed about 10 feet back from the high side of the screen in line with it, and is also staked down securely. When the drive rod is attached to the large reduction pulley and clamped to the screen the device is ready to operate — if the engine will start.

A canvas skirt fastened to the lower end of the screen will keep material from scattering and will deliver it to a sorting table which should be at least 4 feet square. Here one man will be kept busy collecting specimens and rejecting rock fragments and other nonsignificant items that will not pass the screen. By placing wooden rollers on the screen and holding them in place by cross bars, but leaving them free to bounce back and forth with the motion of the screen, we have managed to work fairly heavy damp clay.

Simplicity, minimal cost, ease of repair, ease of transportation, and the fact that the machinery remains clear of the dirt that is being handled, are the aspects that recommend this design. As a time and labor saving device power sifters are a great improvement over all hand-sifting methods. The principal difficulty is likely to be psychological. Impressionable crew members may discover that in the course of a day's work their heads move back and forth at a rate of 150 times a minute and very severe stiff necks have resulted.

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June, 1955

THE STUDY OF OSTEOLOGICAL MATERIALS IN THE PLAINS *

Many archaeological sites in the Missouri Valley have produced large quantities of unworked animal bones. Most of these "food" bones are mammalian, with some bird, turtle, and fish. Recent studies by Lehmer (1952; 1954) and the series of studies by the author in AMERICAN ANTIQUITY (Vols. 17, 19, and 21) indicate that this material has important cultural implications which should not be overlooked. First of all, it is desirable to review briefly some of the questions which can be answered by study of the unworked bone.

1. Did the people exercise any choice in the age of the animals they killed? This question can be determined with a fair degree of probability only with the mammals. An estimate of the age can be determined from the teeth (whether they are deciduous or permanent, and by the amount of wear) and from the relation of the epiphyses to the diaphyses. Criteria for these estimates, applicable to the larger game animals, are given in standard textbooks of the anatomy of the domestic animals.

2. Which elements were brought into the camp or village and which elements were left at the kill? In order to make any inferences concerning the cutting up of the carcass for food, it is necessary to know what elements are present and relatively abundant and what elements are scarce or absent. Most of the limb bones will be broken and in some instances the breaks are characteristic. These data should be recorded.

3. Are the right or left, or front or hind, limb elements most abundant in any particular find? In certain groups the parents and grandparents of the man and wife customarily received specific elements of the carcass, such as the left front leg. This custom presents interesting possibilities concerning the earth lodge villages in the Missouri Valley. In most of the features in the sites from which I have identified the bone the discrepancy between the right and left elements of the limb bones was too great to be accounted for by accident of preservation or sampling. This leads one to believe that studies on the distribution of the kill might be profitable in many sites in the Missouri Valley; a clue to social organization may thus be derived from archaeological material.

* Published by permission of the Secretary of the Smithsonian Institution. This paper was previously published in slightly extended form in the *News Letter of the Plains Archeological Conference*, 1953, Vol. 6, No. 1, pp. 8-15.

4. Which species are more abundant? Certain sites in the Missouri Valley are noteworthy for the scarcity of bison bones and the abundance of medium sized and small game animals. This poses the question of what proportion of meat each species contribute to the diet. If the basic data are collected in such a way that the number of individuals of each species represented in the archaeological sample can be calculated, a satisfactory answer to this question can be determined.

It should not be necessary to emphasize the importance of recording the provenience, or other suitable reference, of each lot of bone. Also, provision should be made for recording unusual features regarding elements in any lot of bones. The method I have used in the past in identifying the osteological material was to spread all of the bone from a single feature on a large table and segregate it according to species. Then the bone for each species was segregated not only according to elements but also according to rights and lefts, and maturity and immaturity. This procedure permits large lots of bone to be identified easily and quickly and to be recorded in a single operation on relatively few data sheets.

Many archaeologists, because they have not given the problem much thought, do not know which elements are identifiable and which are not, and in order to play safe they bring everything in. Others, because they lack the moral courage to make a decision, bring in everything and justify their action by boasting of the capabilities of the physical anthropologist. They forget that physical anthropologists deal with minute differences of only a single species while paleontologists and zoologists deal with only slightly greater differences in several hundred species. They also forget that certain elements of the human skeleton, such as ribs, have no more utility for the physical anthropologists than animal ribs do for the zoologists. Since *all* terrestrial vertebrates are constructed on the same fundamental plan, a course in elementary physical anthropology or comparative anatomy should furnish an adequate background for separating the identifiable and unidentifiable material. Such a separation can be made in the field when the material is being packed for shipment or in the laboratory when it is being washed to recheck for use as an implement. The discarding of the unidentifiable material will save at least 50% of the identification time.

The principle identifiable elements are skull fragments, jaws, hyoids, vertebrae with most of the neural arch, glenoid portion of the scapula, pelvis if nearly complete, limb bones if one end is complete, foot bones, metapodials if one end is complete, and phalanges. Not identifiable are ribs (these are not characteristic even for the orders of mammals), fragments from the shafts of limb bones, scapular fragments without the glenoid, vertebral centra without the neural arch, dorsal spines of vertebrae, and immature limbs without the epiphyses.

Recording of Data. Now comes the tedious task of adding up the total of each element listed on the bone identification sheets. An example of the data sheet used by the author is shown in Figure 129. The totals are entered in the column marked "Mature." In the "Worked" column is listed the worked bone which can be identified according to element. If the rights and lefts cannot be distinguished, divide the total by 2 and enter this as the nearest approximation. For each element add the greatest number of the unworked (either right or left) and worked bone and enter the sum in column marked "Indiv. Repres." To obtain the number of individuals represented by the vertebrae, the total for each section of the column must be divided by the appropriate number for that section. Under "% of greatest number" write 100 opposite the largest number in the preceding column. Express the other elements in this column as percentages of the greatest number.

Butchering Technic. We are now ready to use the data for making inferences. It is obvious that many of the elements are conspicuous by their extreme scarcity and that others are equal to only 40% or 50% of the greatest number. If we use bison as an example, the differences become all the more striking when we remember that a bison has 1 skull, 2 jaws, 2 hyoids, 1 atlas, 1 axis, 5 cervical, 13 dorsal, 6 lumbar, and 12 to 14 caudal vertebrae, 1 sacrum, 8 sternebrae, and the following paired elements, scapula, humerus, radius, ulna, metacarpal, pelvis, femur, tibia, metatarsal, plus 3 pairs of phalanges in each foot, 6 carpals in each forefoot and 4 tarsals in each hind foot. It is necessary not only to give a reasonable explanation for the presence of the elements found but also for the absence of those not found. From here on out the student is on his own. His explanations of the observable data are inferences based on his knowledge, experience, and knowledge of the literature. Ask yourself these questions: How would you do the job, using the same tools as the Indians and working under the same conditions? What was the probable fate of the missing units of each element — accident of preservation, or accident of sampling? Or were they converted into tools and subsequently worn out, carried away, left at the place of butchering, or smashed beyond recognition in cooking or in processing the meat?

Distribution of the Carcass. Having identified the bones of each species of food animal by lot or feature number, segregate the bone identification sheets into groups, each of which represents a single house or lodge. Now, add up the totals for each element for a single house in the same way it was done for butchering technic, keeping the rights and lefts and the mature and immature bones separate. As with butchering technic, the worked bone must be considered also, but only if the rights and lefts can be differentiated. It will not be necessary to calculate the percentage of the greatest number for each element. Repeat for each of the houses excavated. Compare the data sheets for large discrepancies between the fore and hind and between the right and left elements. Small discrepancies are not necessarily significant because they might be due to the accidents of preservation or sampling. After the discrepancies between the limb elements found in the

various houses has been noted and recorded, it may be possible, on the basis of known ethnographic data, to draw some inferences concerning the family groupings of the houses.

Calculating the Proportion of Meat Which Each Species Contributes to the Diet. First, determine the number of individuals of any given species represented in the archaeological sample, from both worked and unworked bones. Multiply the number of individuals by the number of pounds of usable meat for that species (see White 1953, Table 14). This will give the total meat furnished by each species. Repeat for each species

SMITHSONIAN INSTITUTION, RIVER BASIN SURVEYS AF-11
BONE IDENTIFICATION (Revised 4-13-53)

Reservoir Oahe Site No. 39ST6 Feat. No. _____

Genus Bison Species _____

Common Name _____ Ident. by _____

Cat. No.	Element	Mature			Worked ~~Immature~~			Indivs. Repres.	% of Greatest Number ~~Remarks~~
		Rt.	Lt.	Ax.	Rt.	Lt.	Ax.		
	skull, occiput								
	" , horn cores	31	16		19	16		50	36.0
	" , maxilla	25	22					25	18.0
	mandible	82	78					82	60.0
	hyoid	31	30					31	22.4
	vertebra, atlas			6				6	4.3
	" , axis			5				5	3.6
	" , cervical			10				2	1.4
	" , dorsal			23				2	1.4
	" , lumbar			2				1	
	" , sacral			2				2	1.4
	" , caudal			50				5	3.6
	dorsal spines								
	scapula	39	30		99	64		138	100.0
	humerus, proximal	9	13		21	14		34	24.6
	" , distal	37	36					36	26.0
	radius, proximal	30	27					30	21.7
	" , distal	13	20					20	14.5
	ulna, proximal	18	18					18	13.0
	carpals								
	metacarpal, proximal	21	8					21	14.5
	" , distal								
	pelvis	4	6					6	4.3
	femur, head	11	11					11	8.0
	" , proximal	8	5					8	6.0
	" , distal	9	4		2	2		11	8.0
	patella								
	tibia, proximal	12	7		1			13	8.9
	" , distal	43	42					43	31.0
	astragalus	31	29			2		31	22.4
	calcaneum								
	cuboid								
	metatarsal, proximal	12	2		2	1		14	10.0
	" , distal								
	1st phalanx								
	2nd "								
	3rd "								

FIG. 129. Form used for recording data on animal bones from archaeological sites in the Plains.

in the sample. The total meat represented by the osteological material will be the sum of the number of pounds of meat furnished by each species. Now express the pounds of meat furnished by each species as a percentage of the total meat represented by the osteological material.

The Range of Small Mammals. Some genera of small rodents have a wide tolerance with respect to climatic and ecological conditions while others are extremely sensitive to such conditions. The latter may be good indicators of climatic conditions during the period of occupation, providing that contemporaneity can be clearly demonstrated. Since many rodents burrow for nesting purposes, one must be absolutely sure that the rodent has not introduced himself into the site, thereby giving a false clue to the climatic conditions.

LEHMER, D. J.

1952 Animal Bone and Plains Archeology. *News Letter of the Plains Archeological Conference*, Vol. 4, No. 4, pp. 53-5. Lincoln.

1954 Archeological Investigations in the Oahe Dam Area, South Dakota, 1950-51. *River Basin Survey Papers, No. 7. Bureau of American Ethnology, Bulletin* 158. Washington.

WHITE, T. E.

1953 A Method of Calculating the Dietary Percentage of Various Food Animals Utilized by Aboriginal Peoples. *American Antiquity*, Vol. 18, No. 4, pp. 396-8. Salt Lake City.

THEODORE E. WHITE
Dinosaur National Monument
Vernal, Utah
August, 1954

THE BLADE AND THE CORE

If a man who merely amuses himself by flaking flints ventures to offer advice to professional archaeologists, he may be set down as loutish or impertinent. But I will take the chance. I should like to ask the professional brethren to restudy some of the North American sites and look carefully for blades or lamellar flakes. For I am persuaded that blades will be found wherever long, thin, and shapely projectile points are found.

In spite of Holmes (1919, Chapters 13 and 19), it is extremely difficult to make a pretty projectile point by nibbling down a core, whereas it is easy to make one by trimming a blade. The circumstantial evidence indicates that any workman, early or late, who wished to make a long, thin, and delicate point would begin with a blade rather than with a core. The most successful of the contemporary fakers, indeed, have simplified the process by sawing out flat blades with a lapidary saw. They never fool with cores or even with flakes.

But no such instrument as a lapidary saw is needed. The primordial hammerstone is good enough. Some few archaeologists, indeed, seem to believe that the making of blades is a precise and esoteric art, perhaps known only to an enlightened minority of primitive men. Giddings (1954) went so far as to say that: "The microblades involve a precise technique which can hardly have been learned independently in different places by chance."

FIG. 130. Polyhedral core made by author. Longest scar is 4 inches. Photograph by John Ford, University of Houston.

Giddings seems to have erred. I myself learned independently in a different place by chance to make microblades, mesoblades, and macroblades; and I must admit that there is nothing to it. All you do is hit the flint a sharp blow with a hammer. When flint is struck with a hesitant blow, it tends to break in the 3-dimensional curve that the textbooks call conchoidal fracture. When it is struck more sharply, the curve flattens out and a blade results.

FIG. 131. Blades from Real County, Texas (left); from Potter County (center); and finished by author as projectile point (right). Photography by John Ford.

The circumstantial evidence thus seems to be that any workman wishing to make a long, thin, delicate projectile point would have begun by making a blade to be used as his blank. This corresponds to Burkitt's technological history of the European Palaeolithic: the blades appear only when the delicate work begins (Burkitt 1921).

In the exploration of a site, the presence or absence of polyhedral cores will not mean much. Shapely blades can be struck off without leaving symmetrical cores as by-products. The symmetrical core is evidence only that the workman tried to get as many blades as possible from a single chunk of flint. It shows his thriftiness rather than his skill. At most sites, not many blades will be left, since the best ones were converted into finished tools long ago. But I have found perfectly good blades at half a dozen surface sites in Texas, though I am no archaeologist and have done very little surface hunting. Trained men should be able to find blades at many hundreds of sites.

At any rate, I wish they would try.

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1954 Early Man in the Arctic. *Scientific American*. Vol. 190, No. 6. pp. 82-8. New York.

HOLMES, W. H.
1919 Handbook of Aboriginal American Antiquities. Part I, Introductory: The Lithic Industries. *Bureau of American Ethnology, Bulletin* 60. Washington.

H. MEWHINNEY
The Houston Post
Houston, Texas
December, 1954

THE OLDEST SITES OF NORTHEAST SIBERIA

The following survey is intended to cover that portion of Asia lying nearest to the New World and hence presumably most closely related thereto historically and culturally — that is, the lower Lena basin and the region lying east of it, forming the northeastern extension of the continent. For the sake of precision we will set as limits the 110th meridian on the west and latitude 62°, roughly that of Yakutsk, on the south.

As in comparable regions of our own continent, vast portions of this area still remain archaeologically unknown. However, significant work has been done in recent years which merits the attention of Americanists, in particular that by A. P. Okladnikov along the Lena River. Maximum interest will probably attach to the oldest cultural remains uncovered so far in northeast Siberia, and this topic is therefore selected for treatment

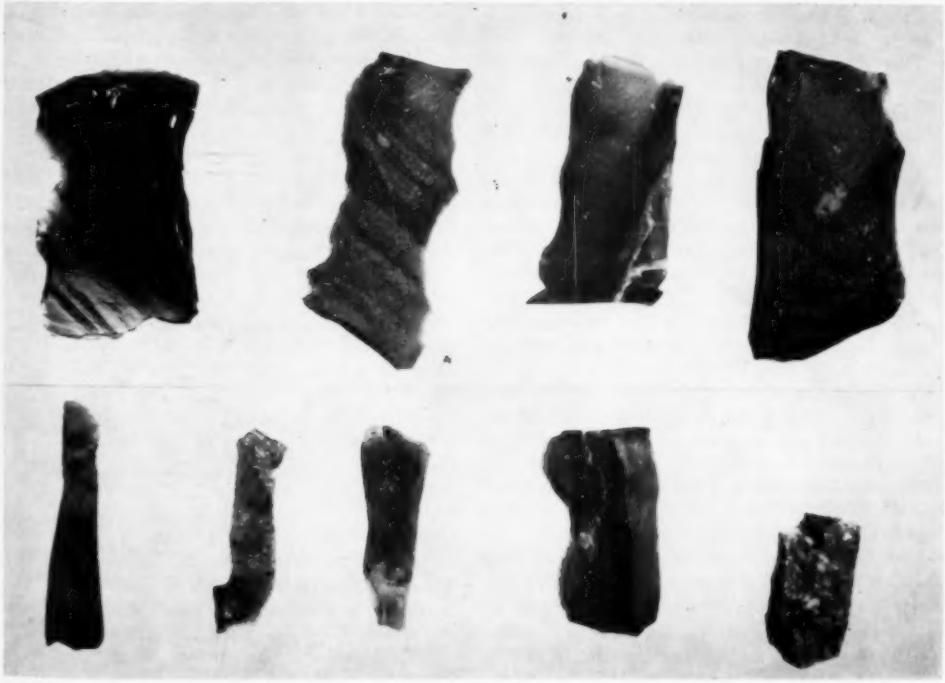

FIG. 132. Blades of obsidian, flint, and Alibates agate. Longest is 3 inches. Photograph by John Ford.

here. The sources of information are the relevant sections of Okladnikov 1945-46, 1947, and 1949, unless otherwise indicated. Numbers in parentheses refer to his illustrations which are reproduced here as Figures 133 and 134, *1-32*.

No Paleolithic finds have yet been reported in the region under consideration, although they occur on the upper Lena. Nor are there any indubitably preceramic sites. All remains that seem to antedate actual knowledge of metal working are classified locally as "Neolithic," and we will use the term henceforth in this sense with no other connotations implied.

Among the considerable number of such Neolithic sites, certain ones are regarded by Russian archaeologists as representing the oldest manifestations of culture in our area. The most important of these is at Uolba Lake, one of a group of forest lakes on the Arctic Circle just west of the Lena, some 20 km. from the settlement of Zhigansk. The upper level of the stratified Kyrdal site here yielded an assemblage typical of the later Neolithic of the Lena Valley. Below this, however, was another cultural deposit not only stratigraphically distinct but differing even in the material used for stone artifacts as well as in the character of the inventory. There were in addition 2 burials that may be somewhat older still, although they display considerable cultural affinity with the lower level. According to Okladnikov, nothing yet found to the south on the middle Lena is as archaic in type and technic as these early Uolba materials.

The burials (one of a child) were extended on the back, arms alongside, head oriented northeast. The graves contained red ocher and 4 peculiar large tanged points "of archaic type" on long, massive lamellar flakes, only partially retouched (*1-4*); also a lamellar flake end scraper (*5*). Okladnikov finds the greatest resemblances to the Uolba artifacts and burial practices in those from the Olenii Ostrov cemetery in Lake Onega, northwestern Russia. (For a description of the latter site, see Ravdonikas 1940; the most reliable dating [Foss 1952: 265] places it around 2000 B.C.) In some respects the Uolba burials also recall those of the Kitoi stage of the Baikal Neolithic. The same date is assigned to the latter (Okladnikov 1950: 139).

An outstanding feature of the lower level itself was the remains of a pit house, evidently the foundation for a rather sizable oval structure. Little could be deduced of the construction, as there was no trace of postholes.

Stone working utilized native black slate almost exclusively. Although large points like those in the burials were lacking, an equally distinctive trihedral point shaped like a file was typical (*6, 7*). Again, the only analogies seem to lie in northern Europe. Small flake points incompletely retouched are also mentioned (*8, 9*). Angle burins on wide massive flakes struck transversely (*10*) were quite different in technic from the common burins of the middle Lena Neolithic. Blades for inserting in slotted knives, retouched on only one side, were very similar to those of the Isakovo (earliest) stage of the Baikal Neolithic. Also noted are lamellar flakes retouched on one edge, and a planoconvex knife or spear point, the convex side retouched but the flat side worked only on the edges. Illustrations show side blades (*11, 12*) and polyhedral cores (*13, 14*).

Three potsherds (one cord marked) may have worked down from the upper level.

The Uolba site is viewed as representing a lacustrine Neolithic culture of the forest zone, with seasonal occupation by a semisedentary fishing population. The abundance of points, however, suggests considerable hunting in addition.

Nearby on the same lake is the Kirpichnyi Sarai ("Brick Shed") site. In general character of finds, except for the pottery, it appears to belong to the same cultural phase as the material we have been discussing. Artifacts include a trihedral point (*15*), shorter, more massive in proportions and somewhat cruder in finish than the original ones; another point on a wide, massive flake (*16*), the under side only partially worked; a burin "of unusual form" (*17*); a punch (*18*); some lamellar flakes; part of a leaf-shaped knife or spear point; and a few other items not sufficiently described. A few potsherds were found, one showing traces of streaking on the exterior, while the inside bore hair imprints and was beveled as if coiled; another had drilled holes.

On the Lena above Siktiakh (which is close to the 70th parallel) are 2 small sites, Cape Obukh and Kestririungkia, attributed to the same complex. Cape Obukh yielded a trihedral point (*19*), an end scraper on a flake analogous to the one in the Uolba burials, a probable insert blade for a slotted knife (*20*), burins "of archaic type" (*21, 22*), and long, regular lamellar flakes. From Kestririungkia there is a conical core (*23*), an "archaic" arrowpoint (*24*), and a very interesting large knife (*25*) bifacially worked, with a technic of secondary retouch typical for the Serovo stage of the Baikal Neolithic sequence. The latter is dated approximately 3000-2500 B.C. according to Okladnikov's calculations (1950: 139).

At 2 other locations on the Lena — Kil'chan opposite the mouth of the Vilui River, and Ebetiem 12 km. above Bulun — small sites yielded an arrowpoint apiece regarded as falling into the early Uolba type, but little else of diagnostic value.

The lower level of Site 1 at Lake Syalakh (near the Lena 90 km. above Zhigansk) has been classified as early by Okladnikov on the basis of "archaic" angle burins (*26-8*). It may or may not fall into the early Uolba phase attributed to the foregoing sites, but in any case the total picture afforded indicates (in Okladnikov's opinion) a relatively early stage of the Lena Neolithic. In addition to the burins, a polishing stone, and utilized flakes, there was net-impressed pottery of Isakovo-Serovo type, the earliest Baikal ware, which Okladnikov would date to the 3rd and 4th millennia B.C. (The present writer, however, is inclined to view with

reserve the upper reaches of Okladnikov's chronology). This pottery was tempered with rather large waterworn quartz grains, had oblique fine-toothed comb stamping on the lip, and perforations through the sides of the rim (29; reproduction in the original source was poor, and this drawing should be regarded merely as an approximation). Altogether, this ware was very reminiscent of that found at the important Malaia Munku site on the middle Lena near Olekminsk; the latter represents, however, a fully-developed or later stage of the Lena Neolithic and has, for instance, burins of a different type.

In the vicinity of Chokurovka on the Lena at about 71° north are a number of small sites scattered over the high terrace. They are apparently surface or blowout finds, each representing a temporary campsite, and are the northernmost Neolithic remains in the Lena Valley. Artifacts include knife or spear points (30) of a type common in the Serovo stage of Baikal; large lamellar flakes; an insert knife blade of usual Lena type (31); a "man's knife similar to North America" (not illustrated); and a polished white slate knife (32) of a type found from Isakovo into Kitoi times in the Baikal-Angara area. The use of white slate is alien to the Lena basin but typical for Baikal and especially for the Angara River. With the polished knife was a very unusual pottery vessel of thick, crude plainware thickly tempered with large angular grains of granite or trap. This ware differs markedly from the usual late Neolithic wares of the middle Lena, and is in fact alien to the whole tradition of that and succeeding stages. Okladnikov suggests it may represent an earlier and hitherto unknown phase. The polished knife, he feels, would corroborate such a dating (assuming, of course, that the associations are not merely fortuitous in this case), and would place the related Chokurovka finds as at least pre-1700 B.C. in terms of the Baikal chronology. At any rate, the knife suggests early links between the Baikal area and this far northern region near the Arctic Ocean.

Of still greater interest to American students is Okladnikov's 1946 field work on the Kolyma River, and it is particularly regrettable that no detailed report of this, and no illustrations, have yet appeared. We have only brief references, often confusing and sometimes contradictory. In general, the outlines of the picture here seem to correspond quite closely with that revealed on the lower Lena, and suggest a uniform Arctic Neolithic culture throughout northeastern Siberia. We are informed in one account that the Pomaskino site yielded stone artifacts very like the oldest Uolba material. Another reference mentions trihedral points, presumably from the same site. The inventory at other sites was analogous to the upper Uolba level and similar contemporary finds.

Even closer to the New World are the 2 sites in the interior of the Chukchi Peninsula previously reported by Krader (1952) and the present writer (Chard 1955) —Yakitikiveem River and Lake Chirovoe. The latter is suggestive of the late Neolithic-early Bronze horizon of the Lena and is tentatively dated 1500-1000 B.C. by Okladnikov. The former is of uncertain age but may be earlier. It has no specific affinities with the cultural manifestations we have been examining, but could conceivably approach their temporal horizon.

To summarize, the complex represented by the lower levels at Uolba Lake seems from all apearances to represent the earliest traces of human occupation yet reported from northeastern Siberia. It was characterized by angle burins, lamellar flakes and cores, side blades, pit dwellings, use of red ocher in burials, and distinctive types of points, some of which find their only analogies far to the west near the Baltic. Pottery seems to have been rare and may not have been present at all in the earliest stages. In addition to its links with northern Europe, the complex also shows cultural affinities with the Baikal-Angara region at the headwaters of the Lena, which is not surprising. There is no indication of any contacts with the Pacific coastal area. Although Okladnikov attaches no specific date to the early Uolba complex, we might, on the basis of his various remarks and comparisons, tentatively suggest around 2000 B.C. as not unreasonable from all points of view.

A few other sites regarded with more or less justification as "early" in local terms are unrelated to this complex and quite probably somewhat later. They suggest steadily increasing influences from the Angara-Baikal cultures.

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October, 1954

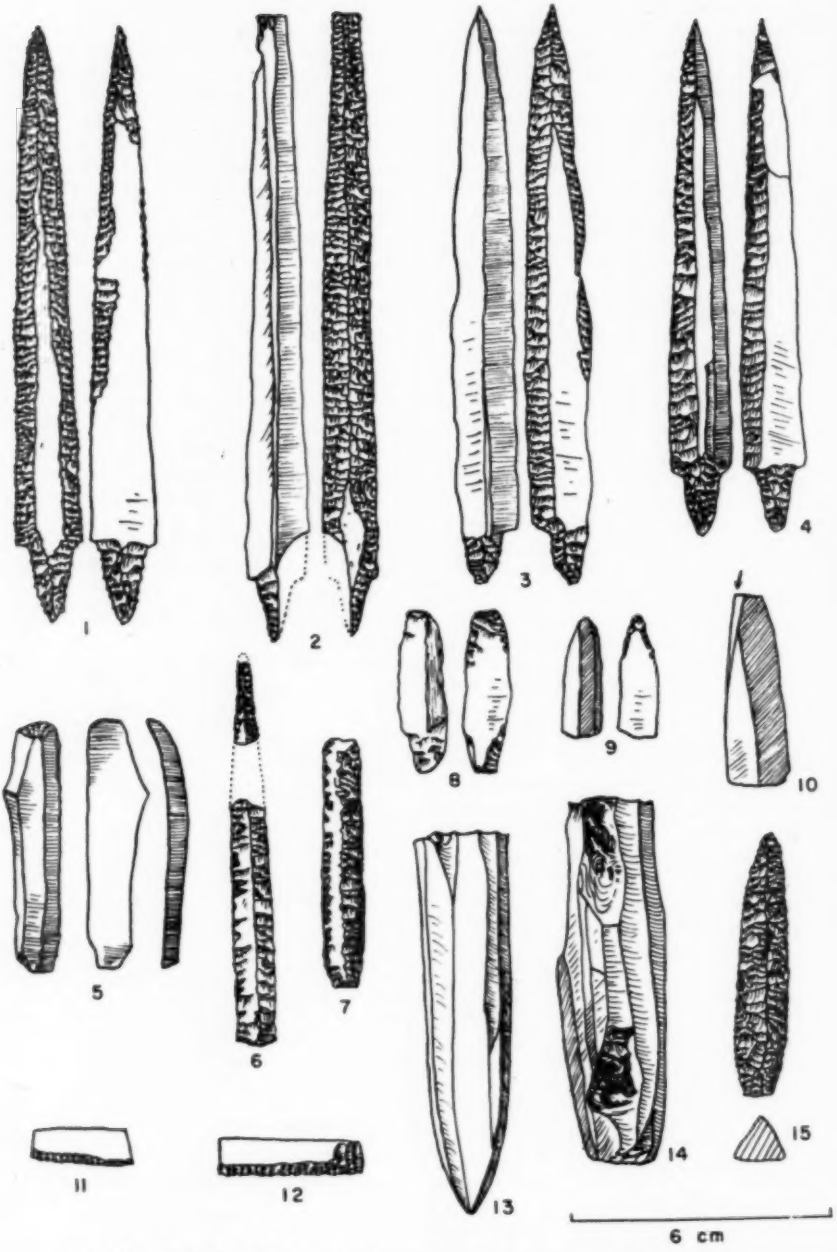

FIG. 133. Early materials from the Lower Lena River (after Okladnikov 1945-46).

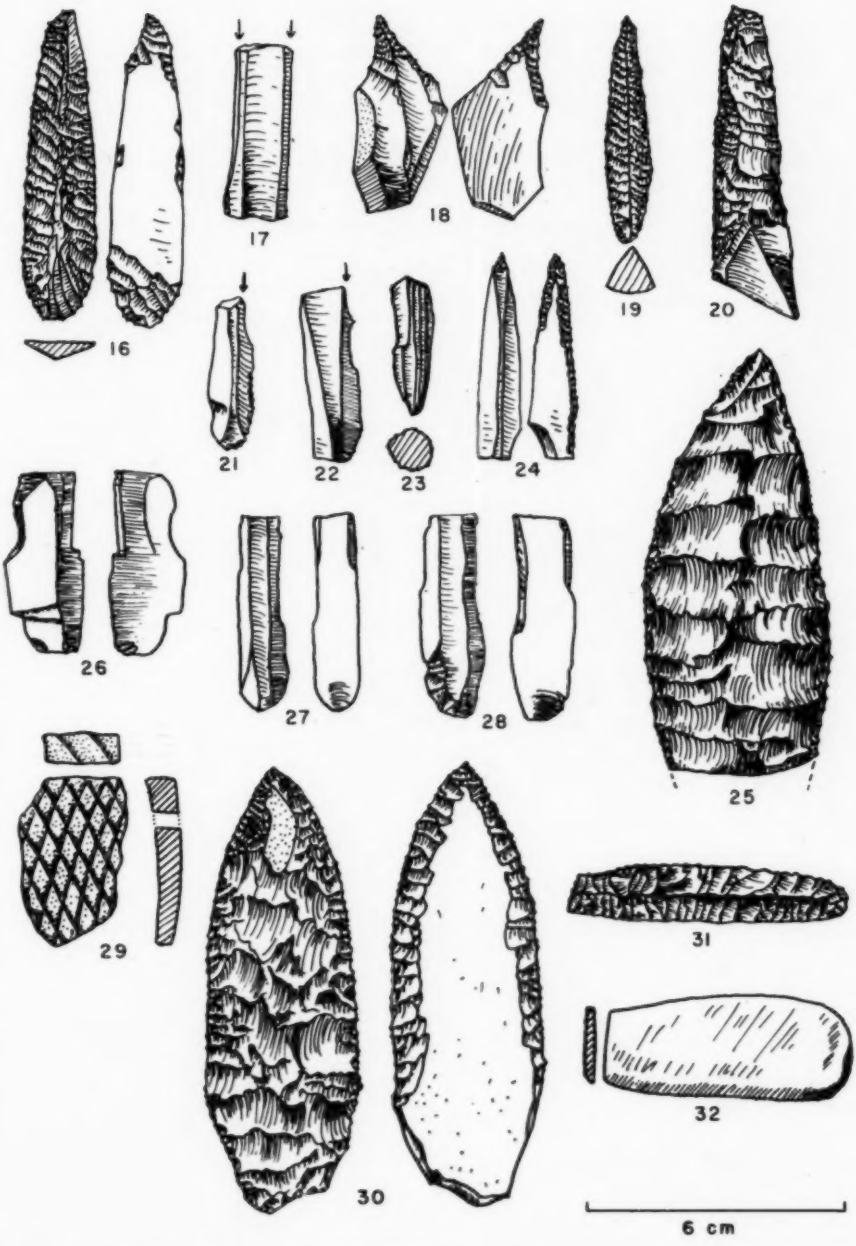

FIG. 134. Early materials from the Lower Lena River (after Okladnikov 1945-46).

WAKEMAP: A COLUMBIA RIVER SITE MISPRONOUNCED

In this day when, according to perhaps too sanguine recent reports, physical anthropology, ethnology, linguistics, folklore, and archaeology are happily converging, it was a shock to hear that a relatively well-known archaeological site on the north side of the Grand Dalles of the Columbia River in the state of Washington is commonly referred to as Wakemáp (rhymes with "lakemap"). According to John M. Corbett of the U.S. National Park Service who has recently visited this old site, originally described in 1805 by Lewis and Clark, such a completely anglicized pronunciation is now common currency among the various archaeological field parties who have been working at or near the site during the last few years, and he never heard of or thought of it as being pronounced otherwise.

Actually, the near-correct pronunciation is Wákemap (rhymes with "knock 'em up"). (For a phonetic rendering see Spier and Sapir 1930: 164.) The name is Wishram in derivation, as given by Sapir (1909: 201), and the traditional site was so identified and designated by Schenck and myself in 1924 (Strong, Schenck, and Steward 1930: 6, 8), and by the Indians in that vicinity. In fact, a very old Indian, Jim Cathlamet, told us a fine *vagina dentata* story which dramatically accounted for the mound with its numerous broken flint points and pestles. According to him the original Wakemap mound was a female ogress who was filled with sharp flints and lured amorous men to painful death. Fortunately, Old Man Coyote heard of this and through the use of 5 long stone pestles accomplished the disintegration of the ogress. Jim was an old, old man with a sugarloaf deformed skull, and, I suspect, may have been a Lower rather than an Upper Chinook Indian. However, the story and its specific identification with the Wakemap mound was known to all the Wishram Indians. Curtis (1911: 113) also gives a local version of the story.

A poor linguist, the writer is no stickler for extreme linguistic finesse, but it does seem that the Indians, not the archaeologists, should have preference here. Wakemap is a fine example of a site that is historically, archaeologically, linguistically, and ethnologically important. It is fervently to be hoped that its full record may be recovered and published before the rising waters cover it.

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October, 1954

ANOTHER CRUCIFORM ARTIFACT FROM SONORA

In the October, 1954, issue of AMERICAN ANTIQUITY (Vol. 20, No. 2, pp. 174-5), A. McL. Howard called attention to a type of cruciform artifact which occurs sporadically through northwestern Mexico and southeastern Arizona. The writer would like to make note of a similar find from a site in west-central Sonora.

This cross (Fig. 135) was found on an extensive village midden in the vicinity of the pueblo of San José de Guaymas, approximately 3.7 km. northeast from the Guaymas airport. The site has temporarily been designated 53:F-71. The object was but one of many obsidian and basalt artifacts found scattered over the site area. It is possible that this cultural occupation represents the predecessors of the surviving Guaymeñas Indians whom Father Kino encountered in 1687.

The artifact is of polished obsidian, with fine secondary chipping along the arms. It measures 39 and 41 mm. tip to tip, and 8 mm. in thickness. This cross supports the highland-coastal relationship already suggested by Ekholm's finds at Guasave and Topolobampo, Sinaloa.

Stone artifacts from the site included numerous projectile points (fishtail; notched with convex base; triangular with rounded-base corners), spearheads, knife blades (both pressure and percussion flaked), side and end scrapers (predominantly percussion flaked; planoconvex), and large single flakes (possibly for opening mussel shells). No sherds were found on this site, although 2 related sites (53:F-73 and F-74, approximately 1.3 km. away) produced limited amounts.

FIG. 135. Cruciform artifact from Sonora.

The artifactual material will eventually be placed upon display or in storage in the Biblioteca y Museo de Sonora in Hermosillo. The field survey was originally contracted with the Instituto Nacional de Antropologia e Historia of Mexico City for the summer of 1952, but the writer was not able to carry out these investigations until 1953. The research was financed in part by the American Philosophical Society (Penrose Fund) and The Kansas Academy of Science. Bill Young, of Springfield, Massachusetts, served in the capacity of field assistant.

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December, 1954

FIG. 136. Anthropomorphic mat from New Mexico.

ANTHROPOMORPHIC MAT FROM NEW MEXICO

Several Southwestern archaeologists who have seen the mat pictured in Figure 136 consider it unusual enough to merit description in print, despite a scarcity of information about its provenience and associations.

The mat has catalog number 943/7 in the collections of the Panhandle-Plains Historical Museum at Canyon, Texas. It was donated to the Museum by Henry Crain of Canyon in 1942. Mr. Crain informs me that he found the mat in a multiroomed cave about ½ mile above the mouth of Mule Creek, a tributary of the San Francisco River in the Mogollon Range of southwestern New Mexico, not far from Clifton, Arizona. He and several hunting companions removed the mat and other archaeological materials from the cave in 1899, when he was ranching in the Mogollon region. Other items included 2 small brown pottery bowls, 2 wooden bows 4 or 5 feet long, and a number of obsidian-tipped arrows. Smaller bows and poorly preserved arrows were left in the cave. Mr. Crain recalls that the cave was later investigated by someone from New Mexico College of Agriculture and Mechanical Arts at Las Cruces.

The shape of the mat is shown in Figure 136. In its present headless condition the specimen is 17 inches long and 12 inches wide. According to Mr. Crain, the head was present when the mat was collected, and was a featureless rectangle somewhat wider than the neck, on which it was centered. Also missing are triangular areas at the outside of the left elbow, the outer corner of the right hand, and the bottom of the right foot.

The mat is made of thin yucca strips from 2 to 4 mm. wide. The material is well preserved, retaining its color and flexibility. The mat is loosely twilled in a two-over, two-under technic, except in the lower body and right leg, where a three-over, three-under technic prevails. Strip ends on the back side are long and unconcealed. The mat retains no trace of painting or other decoration.

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A FLUTED POINT SITE IN UTAH *

The Statewide Archeological Survey of the Department of Anthropology at the University of Utah was recently informed of a site 12 miles east of Ferron, Utah, which has yielded at least one fluted point. Homer Behunin, the local collector who reported the site, found the point (Fig. 137 *a*) protruding from the wall of Silverhorn Wash about 15 feet below the surface.

The Silverhorn Site (42EM8) proved, upon examination, to be a shallow rock shelter in a protected bend of the wash. The shelter contains at least 12 occupation levels separated by sterile alluvial deposits. The uppermost occupation level is covered by about 10 feet of hard, compact alluvium which reaches to within about a foot of the shelter roof. The occupation levels are easily detected through the presence of small pieces of charcoal which have been somewhat disturbed by the inundations which brought in the alluvial materials. In addition to charcoal, small burned areas or hearths, chips, bone fragments, and occasional artifacts are to be found. Limited testing by the author and a group of students failed to produce more fluted points but the bases of 2 blades (Fig. 137 *b*, *c*) were found.

Silverhorn Wash is at the western edge of the San Raphael Swell. It is a short southern tributary of Ferron Creek which in turn is a southern tributary of the San Raphael River. A study of the wash made by Loren W. Slentz of the Department of Geology at the University of Utah has brought out several significant facts. The canyon, at most 100 yards wide, and from 20 to 60 feet deep, was eroded into sandstone bedrock. The

FIG. 137. Fluted point and blade bases from the Silverhorn site (42EM8), near Ferron, Utah. (Actual size.)

* The work herein reported was financed by the University of Utah Research Fund.

wash was then filled with laminated alluvium which at the site is about 30 feet thick. Subsequent to this filling the stream was rejuvenated and cut out most of the alluvial fill to a level about 10 feet above the bedrock, where it again came to grade. Still later a second rejuvenation of the stream resulted in the cutting of the present channel which is about 20 feet wide and is to bedrock. The remnants of 2 terraces with a single fill are, therefore, to be found along the present intermittent stream. Slentz believes that the alluvial material in which the occupation levels are found was laid down as a flood plain deposit by frequent (yearly?) inundations. The 5-foot thick section of fill in which the 12 known occupation levels are concentrated appears to have been deposited in a relatively short time, perhaps not over 50 years. At its mouth, about ¼ mile downstream from the site, the canyon broadens into a level area of several square miles which probably represents a fossil flood-plain lake. A lake at this point would have slowed or even backed up water coming down the wash; thus its presence could account for the smoothly laminated deposits at the site which must have been laid down by very slowly moving water. The deposits in the lake proper are even more uniform than those at the site and the bands can be followed for long distances. The proximity of the lake would have made the rock shelter a desirable campsite in spite of the fact that it was occasionally subject to flooding.

The fluted point from the site is 56.6 mm. long with a maximum width of 24.5 mm., at about the middle. It is of red jasper(?), is somewhat leafshaped, and has a concave base. The flutes are irregular and about half as wide at the point; one flute is half as long as the point, the other is three fourths as long.

The 2 blade bases found during the limited excavation were separated vertically by about 2 feet. The exact stratigraphic relationship between the fluted point and the blade bases is not known except that the fluted point was found higher than at least the lower blade base.

The upper blade base (Fig. 137 c) is of a brownish translucent chalcedony and apparently was originally almost triangular. The maximum width (26 mm.) is at the base. An extension of the lines formed by the

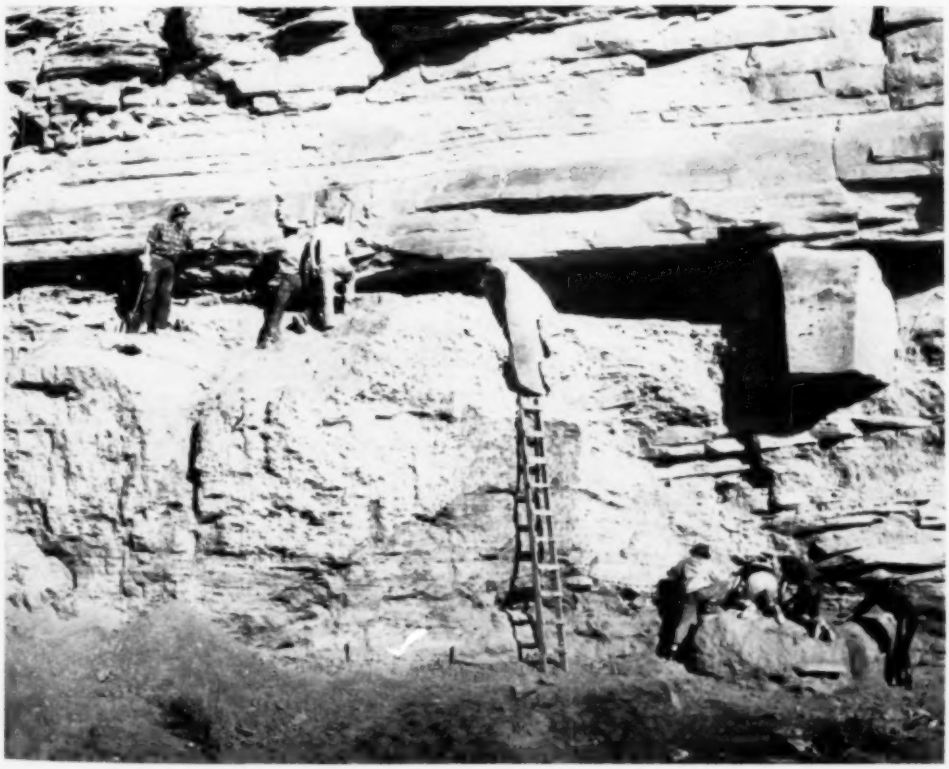

Fig. 138. The Silverhorn site at the beginning of preliminary testing. The bottom half of the ladder is in front of the occupation levels.

sides suggests that the blade was 6 to 7 cm. long. The average thickness along the midline is 4 mm. The chipping is not uniform but there is a suggestion of ripple flaking. An interesting feature of this blade is that the basal edge has been beveled on one side with a narrow single flake extending almost all the way across while the opposite side shows a row of small flake scars.

The lower specimen (Fig. 137 *c*) is of a purplish translucent chalcedony and shows chipping of about the same quality and type as that on the upper blade base. The lower blade fragment also has nearly straight sides and a maximum width of 25 mm. This width occurs where the blade is broken, 37 mm. from the base, and is probably close to the maximum width of the original blade. The minimum width of the blade fragment is 20 mm. and is at the basal edge. The average thickness along the midline is 5 mm. There is some fine retouching on the edges near the base and across the basal edge; perhaps intentional dulling.

These 2 blade fragments resemble ones found with Fremont culture pottery on the surface of a site about 40 miles away. However, they more closely resemble blades found associated with Plainview-like points at sites in the Plains (Davis 1953; Sellards 1952: 72-4).

Work at the site was abandoned only when the occupational debris thinned out and, for practical purposes, disappeared. No further work at the site is planned.

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ADDITIONAL DATA ON THE WOODRUFF OSSUARY, KANSAS

The Woodruff ossuary (14PH4), a prehistoric communal burial site situated just south of the Nebraska line in Phillips County, Kansas, was excavated for the Smithsonian River Basin Surveys in the late summer and fall of 1946. In the report on this work (Kivett 1953) the findings were correlated with earlier observations in Nebraska and the site was assigned to a recurring complex called the Keith focus. The Keith focus is but one of several variants — and perhaps an early one — of the widespread Woodland culture of the Central Plains. It is distinguished chiefly by the following: calcite-tempered pottery designated as Harlan Cord-Roughened; small to large stemmed and barbed projectile points, often serrated; small chipped celts; triangular and crescentic shell pendants as grave offerings, along with great numbers of shell disc beads and bead blanks; perforated canine teeth and unperforated rodent teeth; incised tubular bone beads; and secondary burial of disarticulated bodies in communal pits. Keith focus remains as now known appear to occur mainly in western Kansas, south central Nebraska, and perhaps eastern Colorado. Their relationship to other Woodland manifestations remains obscure for want of stratigraphic evidence. It has long been recognized that Woodland remains of one kind or another represent probably the oldest ceramic tradition yet found in the Central Plains, since they seem to recur consistently at the bottom of stratigraphic sequences in which they and other pottery complexes are represented.

When the Woodruff ossuary collections were received at the U.S. National Museum, it was found that they included a considerable quantity of charred wood. In addition to many small bits, there were large segments of timbers as much as 4 or 5 inches in diameter. All these were from varying depths in the communal burial pit from which were taken the skeletal remains and artifacts reported by Kivett. Since this carbonized material was collected in direct association with archaeological and skeletal remains assignable to a defined prehistoric culture horizon, steps were taken to have the charcoal identified as to the species of trees represented, and then to have it tested for radiocarbon dates. The results of these examinations are here briefly discussed, together with some of their possible implications for Central Plains prehistory.

For species identification, the 31 lots of carbonized wood were divided into 2 groups. One group was submitted to the School of Forestry, Yale University; the other was sent to the Forest Products Laboratory, U.S. Department of Agriculture, Madison. For these identifications, we are indebted to B. Francis Kukachka, Forest Products Laboratory, and Paul B. Sears and William L. Stern, Yale University. Three species were identified, as follows: *Ulmus rubra*, slippery or red elm; *Fraxinus pennsylvanicus lanceolata*, green ash; and *Populus* sp., cottonwood. Samples of all the identified woods were placed in the national collections; and the rest of the ossuary wood, totaling some 40 ounces, was then sent to W. F. Libby, Institute of Nuclear Physics, University of Chicago, for radiocarbon analysis. Libby reports (letter to Wedel, May 5, 1954) the age of this material as 1343 ± 240 years before present, that is, A.D. 611 ± 240 years (or between A.D. 371 and 851).

This dating is somewhat earlier than the estimates heretofore made for Plains Woodland materials, which were thought to have a time range somewhere between A.D. 800 and 1200 (see, for example, Wedel 1940: 303; Champe 1946: 85-9, Fig. 17; Lehmer 1954:141). If the Woodruff ossuary date is substantially correct, all these guess-dates are too late; and pottery making in the Central Plains may actually go back as much as 2 to 5 centuries earlier than most of us had supposed. There

is still no evidence, so far as we are aware, that the cultivation of corn or other domestic crops was associated with the culture of this early ceramic level in the region.

Unless and until the Woodruff date can be strengthened by other archaeological samples from the Central Plains, it cannot be unreservedly accepted. To us, however, it appears to be of an acceptable order. Between the median date, early in the 7th century, and the postulated 13th or 14th century appearance of the patently horticultural Upper Republican peoples, there is suggested a time span of some 6 or 7 centuries. This would conveniently accommodate other possibly later Woodland complexes and probably also the Hopewell horizon represented in the lower Kansas River drainage and around Kansas City. It would also allow time for the laying down of the aeolian and alluvial deposits which in a number of sites are known to intervene between Woodland and later cultures, and probably for the "terrace-building episode in eastern Nebraska" which Champe (1946: 89) has noted between his Early Ceramic (that is, Woodland) and Middle Ceramic (Upper Republican and Nebraska Culture) periods. What we urgently need now, of course, aside from confirmatory or corrective dates for other Keith focus sites are some radiocarbon dates for Valley and Loseke Creek focus stations and for some of the westerly Hopewell village sites and burial mounds.

The Woodruff ossuary date, at A.D. 611±240 years, is one of the first from a defined and named Central Plains Woodland horizon. Another, recently published by Hunt (1954: 114), dates a Woodland site near Denver at A.D. 800±150 years. The exact nature of this site and the complex it represents, and the relationships to the Woodland culture variants now recognized in the Kansas-Nebraska region, are not clear. The Woodruff date is some 400 years earlier than recently published (Beaubien 1953) radiocarbon dates for Iowa Hopewell (A.D. 1053±300 years) and Effigy Mound (A.D. 1023±300 years) sites. It is also earlier than the figures given (Johnson 1951) for Marksville sites (Crooks, A.D. 792±250; Bynum, A.D. 674±150) and for Tchefuncte (A.D. 717±250; A.D. 1317±150); but it is considerably later than most Ohio and some Illinois Hopewell (Arnold and Libby 1951) and Kentucky Adena (Libby 1954) dates, which range from approximately 400 B.C. to the beginning of the Christian era. The Woodruff date is also some 1500 years later than those given for Signal Butte I (Kulp, Feely, and Tryon 1951), and it follows by nearly 2000 years those given by Mulloy (1954: 64-5) for certain preceramic hunting-gathering cultures in western Wyoming. Its time relationship to Signal Butte II remains obscure.

The carbonized wood samples from Woodruff are of interest also for their hints as to the contemporary environmental setting. The species identified are essentially the same ones that characterize the locality today, as they have for a century or more past. When Fremont traveled westward through the locality in 1843, he reported (Fremont 1845: 109) ash-leaved maple (box elder), elm, cottonwood, and a few white oaks on Prairie Dog Creek; and on the next stream west he found that "the prevailing timber is a blue-foliaged ash, (*Fraxinus*, near *F. Americana*) and ash-leaved maple. With these were *Fraxinus Americana*, cottonwood, and long-leaved willow." These remarks suggest that in Fremont's time the present Prairie Dog Creek locality lay in the peripheral zone where ash, box elder, elm, cottonwood, and willow predominated, just beyond the western limit of the oak-hickory forest found in the stream valleys of eastern Kansas and Nebraska. We do not know, of course, the degree of selectivity exercised by the prehistoric Indians in gathering the firewood and other timbers that found their way into the Woodruff essuary. It is at least suggestive, however, that there is nothing in the fairly extensive charcoal sample found here to indicate a tree growth markedly different from that of the present; and it can perhaps be inferred tentatively that the timber along Prairie Dog Creek in Keith focus times was substantially like that of historic times.

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January, 1955

RADIOCARBON DATES AND THE MAYA CORRELATION PROBLEM

This is a plea for caution in using recent and important radiocarbon results as controls in correlating the Classic Maya Long Count with our own chronology. A final choice among alternative day-for-day hypotheses must condition one's view of the meaning of the calendar and of astronomy in Mesoamerican cultures generally. More is at stake than the firm dating of archaeological periods, important as that is, and in our desire for a decision there is danger of oversimplifying the problem. Already there has been a press report that the Spinden 12.9.0.0.0 correlation has been established, though equal support in the new evidence can be claimed for an alternative 12.9.0.0.0 hypothesis of Makemson. Nonspecialists wishing to form opinions as to specific correlations must still study the evidence as a whole. Three excellent summaries, well-spaced in time, have been published by Thompson (1935, 1950) and Andrews (1940).

In this paper a statement of the specific radiocarbon results is followed by an explanation of a check list (Table 18) of alternative published correlations. The list is intended to be overinclusive, rather than the reverse. Certain innovations in the labels are meant to make it easier to keep in mind certain partial likenesses, as well as minor distinctions. Applying the radiocarbon controls to this list, in a simple straightforward manner, seems to render all but the first 3 untenable. In terms of the labels these are all members of a 12.9.0.0.0 "family," the Makemson (A1), and Spinden (A3), and "Modified Spinden" (A2) correlations.

On the record as it stands, no attention has been paid to 3 factors which, singly or in combination, theoretically might account for radiocarbon date limits which do not include the date of the actual carving of the wooden beams involved. It is suggested that an 11.16.0.0.0 correlation, labeled "Modified Thompson 2" (B2), should not be ruled out until doubts on this score are eliminated.

Radiocarbon Dates for 3 Lintel Beams at Tikal. The same Maya "Calendar Round" date, with "half-period" glyph, was carved on 3 wooden lintel beams at Tikal. It surely corresponds to 9.15.10.0.0 of the Long Count, and sound opinion requires us to believe that the actual carvings date from about this time. The first radiocarbon date is based on 2 runs with samples from one of these beams, by Lamont Geological Laboratory, Columbia University. The average result was A.D. 481 ± 120 years (Kulp, Feely, and Tryon 1951). The second radiocarbon date is the average result of especially long runs of approximately 6 weeks, on samples from the other 2 dated beams, by the Institute for Nuclear Studies, University of Chicago. This time we have 451 ± 110 years (Libby 1954). With such close agreement by independent laboratories working on 3 specimens I presume we do not need to worry about technical slips or unknown local factors affecting the counting processes. Because of the long runs at Chicago, I also presume we should reason from the slightly earlier Libby result only, and use it with confidence.

Selected Correlation Hypotheses. Through the years many correlations have been proposed on the basis of 3 sorts of evidence, historical, astronomical and, more recently, ethnological. Unfortunately, preliminary judgments as to reliability of evidence, and as to how it should be interpreted, have been necessary in all categories. The store of evidence to be manipulated has been growing, and this accounts for some of the variety in our check list.

The "Long Count" designations at the left of Table 18 are in common use, and give the position in the classic system for a katun *13 Ahau* which, according to the correlation, would have fallen at the time of the Spanish Conquest in Yucatan, if this method of counting time had not ceased. As is apparent, one of these Long Count labels may apply to several variant members of a "family." I have tagged these with the letters A-D, adding numbers where necessary to distinguish individual members of a family. The families and potential families are related by the fact that each places a given Long Count date earlier or later than does any other by approximately 260 years, or a multiple of 260 years. Radiocarbon or period-indicating archaeological evidence may seem to tolerate one family to the exclusion of all others, but it cannot help in choosing between variants of a single family. Here each must stand on its own merits with respect to other evidence. The possibility that all are wrong needs to be considered. The minor distinctions between members of the same family are important when trying to determine affirmatively that some one of them is correct.

It has been customary to use personal names in identifying different correlations, ignoring minor distinctions, and with a confusing tendency to use several names. The latter might logically be expanded, but the result would be exceedingly clumsy. The personal names in

our list are simplified compromises with this tradition. "Modified" does not necessarily imply acceptance of the modification by the scholar concerned.

I have included 4 variants of the 11.16.0.0.0 family in order to illustrate the lack of rigid precise controls in the evidence. Correlation B1 was first proposed by Goodman, and later Martinez Hernandez sought to reconcile it with astronomical discoveries on the monuments by Teeple. Thompson, with Teeple concurring, proposed Correlation B4. In the literature this has been called the "Thompson," the "Goodman-Thompson," or the "Goodman-Thompson-Martinez" correlation. Beyer, also for astronomical reasons, proposed Correlation B3 as a modification. R. P. C. Schulz, responding to reasoning on the basis of ethnohistorical data by La Farge, proposed Correlation B2. This, which I should like to dub "Modified Thompson 2," has been accepted by Thompson himself. The basic 11.16.0.0.0 hypothesis will undoubtedly stand or fall with the acceptance or rejection of this variant.

La Farge's evidence calls equally for the "Modified Spinden" correlation (A2), and so I have added it, though I do not know whether Spinden has considered it. With it we have a 12.9.0.0.0 as well as an 11.16.0.0.0 correlation which does not presuppose a break in the 260-day calendar as between the Classic Maya on the one hand, and the 16th century Cakchiquel and other modern highland Maya tribes on the other. All other correlations on our list do require such a break, though this count was surely closer to the common people than any other in the complete classic Maya system. It is at least doubtful that Spinden's astronomical case for his correlation would suffer appreciably by acceptance of this modification. He could yield a little to meet new evidence, just as has Thompson.

Attempts to find satisfactory 11.3.0.0.0 and 10.10.0.0.0 correlations have stemmed from ceramicists' opinions that any 11.16.0.0.0 correlation is too early. The 10.10.0.0.0 (D) solution was first worked out by Thompson as a hypothesis to be rejected, but he calls it the Weitzel correlation in his 1950 criticism of it. I add quotes because, among other things, Weitzel speaks of an "approximate correlation," does not mention the correlation constant, and allows "a margin of 60 years either way" (Weizel 1945: 31). It should be noted that even with such an allowance recently differing opinions show a range of more than 7 centuries in the placement of a given Long Count date. This is certainly a situation in which radiocarbon dating can be helpful.

While no one is espousing the Kreichgauer correlation, it is included as representing a point of view which may be valid (see Andrews 1940: 159-61). It is labeled "X" to emphasize the fact that it does not fit into the 260-year pattern of the others.

Precise correlations may be identified by their "ahau equations." These correlation constants are given to the left of the European dates in our table. They are the various Julian day numbers supposedly corresponding to the normal base date of the Long Count. When added to any decimally expressed Long Count number one has the Julian day number for that Long Count number. In the table, 1,407,600 (9.15.10.0.0) has been added to each of the constants to obtain equivalent Julian day numbers, and these have been converted to the dates at the right with the aid of Schram's Chronological Tables. These are the "Old Style" dates to be compared with the radiocarbon result. If the correct correlation has been worked out by anyone, the European equivalent of 9.15.10.0.0 is probably on this list.

Simple Application of Radiocarbon Control. Adding and subtracting the indicated 110-year allowance for error, the limits for the measured samples as found by Libby are A.D. 341 to A.D. 561. What we want is such limits for the carving of the beams. Let us make the simplifying assumption that the "spread" for the age of the samples includes the date of the carving, and

12. 9.0.0.0	A1	Makemson	489,138	AD	480 (Dec. 26)
" " " " "	A2	Modified Spinden	489,383	"	481 (Aug. 28)
" " " " "	A3	Spinden	489,384	"	481 (Aug. 29)
11.16.0.0.0	B1	Goodman, Martinez H.	584,281	"	741 (Jun. 22)
" " " " "	B2	Modified Thompson 2	584,283	"	741 (Jun. 24)
" " " " "	B3	Modified Thompson 1	584,284	"	741 (Jun. 25)
" " " " "	B4	Thompson	584,285	"	741 (Jun. 26)
	X	Kreichgauer	626,927	"	858 (Mar. 26)
11. 3.0.0.0	C	Escalona Ramos	679,108	"	1001 (Feb. 4)
10.10.0.0.0	D	"Weitzel"	774,078	"	1261 (Feb. 9)

TABLE 18. Selected correlations with European (O.S.) dates equivalent to 9.15.10.0.0 3 Ahau 3 Mol.

consider later whether this is justified. On this basis we must throw out everything on our list except the 3 12.9.0.0.0 alternatives. Even the 11.16.0.0.0 correlation places the date on the lintels outside the limits by nearly twice the 110-year allowance for error, and this has already been allowed for in fixing the limits.

Complicating Factors. Spinden and Makemson can each accept the foregoing result as expectable, and each may fairly expect reconsiderations of their fundamentally differing approaches to portions of the evidence as a whole. The time distances are such that any 11.3.0.0.0 or 10.10.0.0.0 variant now seems out of the question. Shall we say the same for the Modified Thompson 2 (B2) variant of the 11.16.0.0.0 hypothesis? It misses the radiocarbon limits by 180 years, yet Goodman's original suggestion is that one which, up until now, seems to have shown real and promising survival value as new evidence has become available, and new understandings of it have been developed. Only with this one has it been possible to make minor adjustments as required in one category of evidence without really cutting loose from apparently good controls in others, and then explaining the latter away. In such a situation I submit that we should reserve final judgment until it is certain that the 180-year gap really must mean what it certainly seems to mean.

For this, expert attention to 3 factors seems called for. *First*, we should remember that before coming to museums, and for many centuries in a region of heavy rainfall, the beams supported masses of burned lime and limestone masonry, capped by vegetation. Is it certain that, under these conditions, there was no contamination having the effect of substantially reducing the radioactivity of the 3 beams, and in approximately equal amounts? (I suppose the answer to this will be in the negative, but surely the answer, whatever it is, should be in the record.) *Second*, are the radiocarbon measurements of the samples fair indicators of the times of cutting, in these particular cases? Involved here is the fact, pointed out to me by Louis Giddings, that a sample from near the center of a log gives an earlier date than one from the periphery. Presumably all of the wood of the samples grew *some* time before the respective cuttings, and therefore the limits based on the average readings for the samples ought to be advanced by *some* amount, when times of carving are being considered. If botanists familiar with the tropical hardwoods concerned were supplied with cross sections of the beams and full data respecting the positions of the samples, perhaps they could provide sound minimum-maximum estimates for such an adjustment. At present, how do we know that such estimates would be so small in amount as to be nonsignificant for the problem of dating the carving? *Third*, are we safe in assuming that the dates were carved shortly after cutting, rather than after the wood had been thoroughly seasoned? If the latter, one would have the possibility of a 9.15.10.0.0. re-use of very old beams salvaged from buildings then being destroyed. Re-use of stone by the Classic Maya certainly occurred, and presumably wooden elements, when sound and suitable, were not discarded. The question is whether such beams would seem suitable for carving. The possibility could be eliminated if a study of these particular beams could show that they were carved while green. If possible, I think it ought to be eliminated before finally discarding the 11.16.0.0.0 correlation, and perhaps modern expert carvers could determine the point.

Conclusions. The importance of the radiocarbon evidence can scarcely be overemphasized, but it remains true that a correct day-for-day correlation should fit reasonable interpretations of the evidence in all the other categories. Thompson has been the leader in testing all proposals from this point of view, very recently coming to the conclusion that what I have called the "Modified Thompson 2" variant of the 11.16.0.0.0 family is the most acceptable, though conceding that "the evidence in its favor is not irrefutable" (Thompson 1950: 303).

The new radiocarbon evidence does seem to refute this correlation as well as other "later" ones, and also it seems to negate archaeologists' reasoning to the effect that a 12.9.0.0.0 correlation is too early. It does not, however, remove what some will consider serious astronomical objections to either of 2 variants of the Spinden 12.9.0.0.0 correlation. Similarly the Makemson 12.9.0.0.0 correlation, designed to meet astronomical requirements, still requires drastic explainings-away of ethnohistorical evidence. Thus, in final effect the radiocarbon results on the beams from Tikal may lead to a search for another correlation, or to a pessimistic conclusion that no day-for-day correlation can be definitely established because of breaks in various calendrical counts and/or ambiguity in Maya astronomical data.

This gloomy prospect underscores a plea for investigation of the 3 complicating factors given above. Findings as to these, individually or in combination, theoretically might permit reconciliation of the 11.16.0.0.0 hypothesis with the radiocarbon limits for the samples measured. I do not suggest that this is particularly likely, but I do suggest that it would be a mistake to close the door on this correlation before they are disposed of satisfactorily.

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LINTON SATTERTHWAITE
The University Museum
Philadelphia, Pa.
January, 1955

RADIOCARBON DATES FROM ELLSWORTH FALLS, MAINE

Through the kindness of H. R. Crane and the Radiocarbon Laboratory, Michigan Memorial, Phoenix Project, ages of 2 samples of charcoal submitted by us have been determined. The samples in question were secured by us at the Smith Farm, Ellsworth Falls, Maine, during the summers of 1949 and 1950. Sample M89 was run twice and assays at 4150 ± 450, and 3800 ± 400, average 3959 ± 310 or 2005 B.C. Sample M90 assays at 3350 ± 400 or 1400 B.C.

These samples were gathered and brought in under circumstances that would be frowned on today. Pieces of charcoal were put in cloth specimen bags which had been used several times and laundered in a washing machine. Workers had not at that time received instructions regarding methods and containers, and it is certain that some of the pieces were brought in in sandwich bags. Whatever the method of collecting, results are consistent with other radiocarbon dates for comparable horizons in the northeast.

The Ellsworth Falls sites are two in number — Wasp Island, and the Smith Farm — situated respectively on the west and east sides of the Union River, not far upstream from the bridges on which U.S. Highway 1 and the Maine Central Railroad cross that stream. During the summers of 1947-1950, inclusive, a program of excavation was carried on there under the auspices of the Robert Abbe Museum of Stone Age Antiquities, Bar Harbor, Maine, and the Robert S. Peabody Foundation for Archaeology, Phillips Academy, Andover, Massachusetts. This work revealed artifacts down to a depth of as much as 40 inches, buried in silts deposited by the flooding river.

Horizons represent the modern era, from which we have a .22 caliber bullet and some buttons; the period of lumber drives, covering approximately a century; a protohistoric period, possibly allied to late Owasco and Iroquois in New York; the Point Peninsula horizons; and Archaic. The Archaic seems to equate with Red Paint cemeteries, but an older level is represented by large chipped choppers, chipped hammerstones, pebble hammerstones, polished implements including a gouge, an adz, and slate points, and sandstone polishing tools with which the slate points were finished. Fragments of stone rods also occur at this level. Below the lowermost occupation zone, one finds extremely hard compacted silt or clay, usually showing heavy staining with manganese. No evidence of occupation has been found in this zone.

Sample M89 was taken from a pit in Section D2. The charcoal, which lay between 26 and 29 inches below the surface was recognized at the time of excavation as carbonized bark, perhaps from a lining for the pit. No evidence of fire was noted either in the soil surrounding the pit, in its center, or immediately above it. No sign of the pit was seen above the 26-inch level, nor was there any evidence to connect it with a distinguishable occupation level. The base of a pit to the west extended to a depth of approximately 25 inches; a second pit, to the east, reached 20 inches. Both these pits contained sherds of Vinette I pottery, ashes, and fine pieces of charcoal. The side of the eastern pit connected with a compacted living surface containing ashes, charcoal, stone implements, and more Vinette I sherds, but the edge of the western pit could not be followed all the way up to the floor. There can be no possible connection between sample M89 and these levels.

The soil in which the charcoal was found is a light yellow compact silt, in which flecks of charcoal occur. There are some gray areas in this zone. Chips of stone of various kinds, but chiefly of porphyritic felsite similar to the Mount Kineo outcrop, are also met with. Other artifacts found in this zone are a large side-notched point, corner-removed points with parallel-sided stem and straight base, and a fragment of a drill. This does not permit assignment of the charcoal to any particular archaeological horizon, although none of the pieces is out of place in an Archaic context.

Below the pit is a horizon characterized by a profusion of chips of porphyritic felsite, some of which show evidence of use or cursory shaping; pebble hammerstones of various shapes and sizes; large plano-convex scraper-like implements and irregularly shaped cores of felsite, possibly intended for use as hammers; ovoid pebbles with shallow notches pecked in each end which are probably bola stones; pebble whetstones; and small irregularly shaped faceted sandstone whetstones. Similar whetstones were found on Wasp Island in association with polished lanceolate slate points, spall scrapers or knives, gouges, adzes, and stone rods. All these items occurred in the lowest level there, and it seems in keeping to add them to the inventory for the lowest level at Smith Farm to complete the roster.

This lowest horizon extends another 12 inches below the pit from which sample M89 was taken. It is distinguishable in a profile by reason of a reddening of the soil, in places to a very noticeable degree, by an increase in the amount of charcoal scattered in the soil, and in a few places by darkening of the soil through the addi-

tion of general refuse. Although a few white flecks, possibly the last vestiges of bone or shell, were seen in some dark zones, no traces of bone tools were found. It is to be assumed that there was a large inventory of bone and wooden implements for taking fish at such a site, especially since we found very few stone projectiles. In view of the paucity of chipped implements, especially characteristic forms of projectiles, it is difficult to equate this horizon with any hitherto described. It is worth noting that similarities may be found among the inventories of the Archaic in the Ohio and Tennessee watersheds, and in the Lamoka, Frontenac, and Laurentian of New York.

Sample M90 was taken from the darkest part of a hearth between 15 and 17 inches below the surface, in Section C8. This portion of the site consisted of strata that were in general parallel, but decidedly irregular in detail. These seem to be the remains of living floors, ashes, charcoal, and fire areas interspersed with zones that showed less intense evidence of occupation. Surfaces of these layers are far from horizontal, or even straight, and it must be assumed that this irregularity is due not only to the vagaries of the human beings who lived on the surfaces, but also in part to the action of water. Not only during the century when the site was submerged, but before and after that time, when there must have been marked differences in the level of ground water, great changes must have occurred in organic refuse buried in such floors. Below the darkened zones was light-colored silt, found anywhere from 19 to 30 inches below the surface. This extended to the manganese-stained silt.

The hearth complex from which sample M90 was obtained was first noticed just below the grass roots. Large stones, apparently bordering a fire place, were found at the base of recently deposited silty soil on which the grass was growing. The fireplace must have been used during the last aboriginal occupation of the site. Amongst the stones, there was clear evidence of fire, in the form of ashes, charcoal, and red, burned soil, and this extended downward until it led to another stone-bordered fireplace at lower depth. Below these stones there were, in turn, still more. Ultimately the fire area was traced downward from the surface to and into the yellow silt, for a depth of 22 inches. The centers of all hearths were not in a vertical line, but moved from the general center one way or another as lower levels were reached. In fact, at the lower levels there appear to have been 2 hearths. The deposit seems to have been built up by a group, perhaps a family, returning to the same place, year after year, and adding new stones as the silt built up around the fireplace. At intervals, higher freshets seem to have laid a blanket of silt over the fire, but this does not seem to have interfered with the customary use, or necessarily to have dictated the addition of more stones. Such high water did, however, isolate lenses of charcoal and ash between layers of silt. If a hearth complex is correctly interpreted as the result of a single group returning year after year to the traditional spot, it indicates a tremendously long tenure of rights, uninterrupted by innovations that carried the proprietors from Archaic levels through the Point Peninsula stages to protohistoric and historic aboriginal culture!

Sample M90 was taken from an element in the hearth complex which was first encountered at a depth of 18 inches under a large stone that bordered a hearth at a higher level. The pit extended downward into the yellow silt. Its age is given as 3350 ± 400 years, which puts it back to 1400 B.C. At comparable depths are 2 gouges and an ovoid atlatl weight that can be duplicated from Red Paint cemeteries. At a slightly lower level there are adzes and a plummet, which are also typically of Red Paint forms. It therefore appears that M90 dates the phases of the Archaic Red Paint horizon immediately preceding the introduction of pottery and other cultural elements attendant on the transition to Woodland I. M89 cannot be said to date the earliest stages of this expression of the Archaic, but appears to belong perhaps midway in its history.

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February, 1955

AN EARLY SPECULATION CONCERNING THE ASIATIC ORIGIN OF THE AMERICAN INDIAN

Speculations concerning the origin of the American Indian began almost as soon as it became known that *America Septentrional* was inhabited. Most current theories favor an Asiatic origin, with migration through northern Kamchatka and Alaska. This is supported by rather plentiful evidence. A few anthropologists postulate an island-hopping trans-Pacific migration at relatively low latitudes. This theory is supported by conclusive modern proof that such voyages are possible. Other proposed origins include Palestine ("The Lost Tribes of Israel"), Argentina (Ameghino's "Hombre Terciaro"), various lost continents (such as James Churchward's Mu), and other planets, some no longer extant. These latter theories are based either on misinterpreted evidence (such as the Hombre Terciaro), or overactive imagination (such as Mu), and merit no further consideration here.

Although the theory of Asiatic origin of the American Indian is the most widely accepted today, its first proposal seems quite difficult to locate, particularly as Columbus and his crewmen believed that the inhabitants of the New World were Asiatics. Not infrequently, the initial proposal is credited erroneously to such pioneer anthropologists as the late Ales Hrdlička or the still-productive Frederick Webb Hodge.

Recent rediscovery, translation, and publication in English (Treutlein 1949) of the *Description of the Province of Sonora*, by Father Ignaz Pfefferkorn, S. J. (1794-95), originally published in German, discloses a clear statement that the hypothesis was not new in 1794, and indicates the existence, or former existence, of a treatise on the subject. (The archives of the Society of Jesus are currently being searched for this.) Pertinent statements from Treutlein's translation (1949: 161) are:

> The origin of the American natives and the route by which they came to America have long been matters of dispute. On this subject I had prepared a treatise wherein . . . I sought to show that in the northern regions America and Asia meet or are separated by such a narrow strait that people and animals might pass without difficulty from one continent to the other. I had intended to begin the second volume of my *Description of Sonora* with this discussion. However, after reading in the third voyage of the famous Englishman, Cook, that this strait, the existence of which I had only conjectured, had actually been discovered in about the sixty-fourth degree of north latitude, that it had been sailed through, and had been found by him and his successor, Captain King, to be a distance of only about thirteen hours in width, I do not wish to delay my reader with my conjectures. To me it is almost certain that the first inhabitants of America really came by way of this strait.

Pfefferkorn's geographical knowledge apparently did not include Adam Aigenler's world map, dated 1664, which plainly shows the proximity of Asia and North America in high latitudes, and the narrow strait, labeled "Strait of Anian" between them. Aigenler's geographican manual (Aigenler 1668; Ives, 1953) was widely used by Jesuit missionaries and explorers in western North America.

From the foregoing it is apparent that Pfefferkorn, prior to 1794, was familiar with the hypothesis of an Asiatic origin for the American Indian, and that, if the still-unlocated treatise referred to is found, an early and historically interesting detailing of it may exist.

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1668 *Tabula Geographico-Horologa Universalis. . . .* Ingolstat.

IVES, R. L.

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PFEFFERKORN, IGNAZ

1794-95 *Beschreibung der Landschaft Sonora samt andern merkwürdingen Nachrichten von dem innern Theilen Neu-Spaniens und Reise aus Amerika bis in Deutschland.* Köln am Rheine.

TREUTLEIN, T. E. (TRANSLATOR)

1949 Pfefferkorn's Description of the Province of Sonora. *Coronado Quarto Centennial Publications, 1540-1940*, Vol. 12. University of New Mexico Press, Albuquerque.

RONALD L. IVES
Williamsville, N.Y.
December, 1954

1955 VIKING FUND MEDALISTS

Archaeology

CHOSEN BY

THE SOCIETY FOR AMERICAN ARCHAEOLOGY

J. ERIC S. THOMPSON

This award is made in recognition of solid and extensive research work and brilliant publication. Thompson is widely known as an epigrapher, a dirt archaeologist, and a field ethnologist, whose investigations have thrown searching light on the past and present of the brilliant Maya civilization. He is one of the formulators of the widely used Goodman-Martinez Hernandez-Thompson correlation between the Christian and Maya chronologies. His latest, of many, publications is *The Rise and Fall of Maya Civilization* (1954).

General Anthropology

CHOSEN BY

THE AMERICAN ANTHROPOLOGICAL ASSOCIATION

A. IRVING HALLOWELL

Physical Anthropology

CHOSEN BY

AMERICAN ASSOCIATION OF PHYSICAL ANTHROPOLOGISTS

SIR WILFRID E. LE GROS CLARK

PREVIOUS VIKING MEDALISTS IN ARCHAEOLOGY

ALFRED VINCENT KIDDER, 1946
JOHN OTIS BREW, 1947
ALEX DONY KRIEGER, 1948
HALLAM LEONARD MOVIUS, JR., 1949
EMIL WALTER HAURY, 1950
FRANK HAROLD HANNA ROBERTS, JR., 1951
ALFONSO CASO, 1952
GORDON RANDOLPH WILLEY, 1953
WILLIAM DUNCAN STRONG, 1954

REVIEWS

EDITED BY RAYMOND H. THOMPSON

Introducción a la Arqueología. IGNACIO BERNAL. Sección de Obras de Antropología, Fondo de Cultura Económica, Mexico, 1952. 168 pp., 10 figs., 13 pls. $2.05 (16 pesos).

This book is precisely what the title indicates: an introduction to archaeology. It does not pretend anything more than to give beginning students and interested amateurs an acquaintance with basic archaeological technics and the primary principles and theoretical aspects of archaeological interpretation and cultural reconstruction. If this book were in English it would not possess the importance it has. However, as Alfonso Caso indicates in the preface, this is the first book of its kind available in Spanish. When one recalls the vast archaeological resources of Spanish-speaking America its importance becomes readily apparent.

The work is organized as follows: chapters on general considerations, field archaeology, the archaeologist in the laboratory, plus 3 appendices. The general chapter orients the beginner, disposing of many popular misconceptions about the archaeologist. Bernal has a very good discussion of the role of the archaeologist in relation to the historian; he emphasizes the archaeologist's role as a cultural historian, indicating its importance in countries such as Mexico where modern culture is so directly tied to the past. In the concluding paragraphs of this section the problem of function and meaning in archaeology is considered at some length. The influence of W. W. Taylor is evident. The professional archaeologist would find much to criticize in this discussion. But, in such a volume, the fact that Bernal raises the problems and delineates them as clearly as he does is a commendation. There is criticism of overspecialization in archaeology and its use as a means of avoiding interpretation. However, Bernal recognizes both the difficulties of complete functional interpretation, and the role of the "romance of archaeology" in the motivations of the most tough-minded archaeologist by quoting A. V. Kidder on "digging for digging's sake."

The chapter devoted to field archaeology is again only an introduction. There are sections dealing with preparation for the field, various types of stratigraphy, methods of excavation, surface collections, mapping, photography, specimen segregation, and so on. Of great interest and practicality is a section concerning problems one might encounter with local inhabitants, politicians, clergy, and the like. The ability to deal with such groups often assumes critical proportions in Latin America. In fact, for those *norteamericanos* planning work in Latin America for the first time, the reading of this section will at least prepare them for the experience of living in another culture.

Two quotations set the tone of the third chapter: "The goal is to interpret our archaeological material in terms of concrete human behavior or, what is the same thing, to convert it into history in the expanded sense that we have given the term." And "in all the first aspects [of his work], the archaeologist is simply a technician; afterwards he converts himself into an anthropologist and historian. . . ." With these statements as underlying admonitions, Bernal proceeds to discuss the problems of classification and typology. There is a tightly written, elementary consideration of cultural processes as they may be applied to archaeology, and a good short peroration on scientific method, the need for conscious hypothesis in archaeology, and a criticism of the overcaution of many archaeologists in the interpretation of their data. The chapter concludes with a short section on the preparation of a report for publication.

There are 3 appendices: a listing of the subject matter of the courses in the Escuela Nacional de Antropología e Historia to indicate the training desirable for an archaeologist, 3 sample lists of equipment needed by the archaeologist in the field, and a short discussion on methods of dating.

As an *introduction* I find only one major criticism, the lack of an index for the book. Otherwise, the stated purpose of the book precludes any justifiable criticism, of which there would be much if this purported to be a critical treatment of archaeological method. Bernal attempts throughout to instill in the reader a philosophy of scientific archaeology in the widest sense. The broad scope of his illustrative materials from both the Old and New World is to be commended. This is an elementary discussion of the problems and methods of the archaeologist written in an informative and lively style, bringing home to the reader that scientific archaeology carries more satisfaction than "pot-hunting" and "treasure-troving."

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Climatic Change: Evidence, Causes, and Effects. Edited by HARLOW SHAPLEY. Harvard University Press, Cambridge, 1953. xii+318 pp., illus. $6.00.

This book consists of 22 papers presented at a conference in Boston in May, 1952. The papers treat climatic changes from the viewpoint of several sciences, but only problems of direct interest to American archaeologists are reviewed here.

The climatic changes during the Pleistocene or Quaternary seem to have consisted mainly of alternate expansion and shrinking-disappearance of the polar cap zone of glaciation, accompanied by latitudinal shifts and compressions or expansions of the other climatic zones

(Hurd Willett, p. 54). During the glacials the polar cap zone had large extent, the mid-latitudinal belt of cyclonic storms was much wider and stormier than now, and the subtropical high-pressure belt was displaced equatorward, narrowed, and intensified. Heavy mid-latitudinal precipitation gave rise to ice sheets on the polar side and to large pluvial lakes on the equatorial side. Climatic changes may have run in phase on both sides of the equator (pp. 53, 57). The present climate is perhaps roughly two-thirds of the way from the glacial to the interglacial extreme (p. 54). The outstanding difference between glacial and nonglacial climate is that high latitudes are very cold in the former, relatively warm in the latter (C. E. P. Brooks, pp. 123, 124). At least most climatic changes are generally believed to have been cyclic in a liberal sense.

An attractive theory of the causes of climatic changes is presented by Willett (pp. 62-6). It is limited to the Quaternary during which the outlines and the surface forms of the continents, and consequently also the dependent circulations of the atmosphere and of the oceans, have remained essentially unchanged (p. 51). The theory attributes climatic changes to variations in the intensity of the solar corpuscular (charged particle) radiation of which the sunspots are indices. This radiation acts exclusively in high latitudes of the earth (p. 133). In modern time maxima and minima of sunspots have been accompanied by maxima and minima of glacier retreat (pp. 64, 165).

Other theories of climatic change are also discussed. Terrestrial factors, mainly continentality and volcanic activity, are deemed generally inadequate to explain the recurring phenomena (pp. 58, 107; compare however, pp. 100-3) as are astronomical changes (pp. 59, 157) and variations of the solar electromagnetic radiation, that is of the solar constant (p. 61; compare however, pp. 128-31).

R. F. Flint lists several climatic conclusions from glacial geology (p. 176). E. S. Deevey summarizes the Late-glacial (Deglacial) and Postglacial (Neothermal) climatic changes in New England and northwestern Europe and presents the main classifications and divisions in a table (pp. 274-9). Most American pollen profiles do not record the temperature drops which must have been factors in the Cary and Mankato ice readvances (p. 276). During Mankato time forests appear to have lived much nearer the ice in North America than in Europe, so that an abundance of forest tree pollen masked the evidence of the tundra here (p. 276).

The areal extent and contemporaneity of past climatic phases and changes, and their correlation and dating, are important problems. Willett assumes that all climatic fluctuations have run closely in phase in the northern and southern Hemispheres (pp. 53, 57). Flint sees a distinct similarity of events in North America and in Europe during the last glaciation which suggests, as do radiocarbon dates of one horizon, contemporaneity of climatic variations here and there (pp. 175, 177). Deevey correlates the forest histories on both sides of the Atlantic (pp. 275, 279). He recognizes that the Altithermal phase was widespread (p. 278). Deevey's term "Thermal Maximum" seems inappropriate for the *age* but well suited for the temperature *peak*.

Flint's (p. 175) and Deevey's (pp. 275, 279) correlation of the Mankato (Valders) glacial maximum with the Fennoscandian moraines (Salpausselkä stage) has unreasonable implications and cannot be right, as I have shown elsewhere. Flint's (p. 174) and Willett's (p. 55) date of about 1000 B.C. for the Cochrane stage does not allow enough time for subsequent events, as Deevey points out (p. 278). Moreover, it is in conflict with the fact (p. 56) that most glaciers disappeared and the Greenland ice shrank during the Altithermal. Because Danger Cave stands 220 feet below the Stansbury shoreline and 107 feet above modern Great Salt Lake, the similar radiocarbon dates for the oldest organic remains in the cave and for the Two Creeks forest bed incongruously correlate the Mankato glacial maximum with a small lake remnant, not with the Stansbury shore as Deevey suggests (pp. 279, 297).

For decades I have advocated other correlations of the Deglacial and Neothermal temperature ages of North America and Europe, correlations which are reasonable and probable. Therefore, either similar successions of temperature phases were contemporaneous on both sides of the Atlantic, while some radiocarbon dates are wrong; or these same radiocarbon dates are right, while the ice retreat from Milwaukee to Cochrane had no correspondence in Europe. This latter is, of course, absurd — but an implication of the radiocarbon dates, for bogs in Mont Tremblant Park, Quebec, record all the Neothermal temperature ages *after* the Cochrane stage.

Laurence Kulp describes methods of radioisotope dating and presents dates. His radiocarbon date of more than 25,000 years for the Cary glacial maximum in the Mississippi delta (p. 205) is in accord with my dating based on varves and estimates.

Treerings supply the best climatic data where temperature or precipitation is a strictly limiting factor (Edmund Schulman, p. 209). Near the Arctic tree line the rings register the fluctuations in summer temperature. In the semiarid West stunted conifers on the lower forest border record yearly rainfall (July-June) and runoff (October-September). Colorado River basin data and prehistoric beams form a chronology extending back to 58 B.C. (p. 212).

Zoologists have correlated environment with color, size, and form of animals and have deduced some ecological rules; Carleton Coon has applied these rules to man with very interesting results. The dependence of human culture on the climatic environment is dealt with by Paul Sears.

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Geochronology. With Special Reference to Southwestern United States. Edited by TERAH L. SMILEY. University of Arizona Bulletin Series, Vol. 26, No. 2, Physical Science Bulletin No. 2, Contribution No. 1 of the Program in Geochronology-Dendrochronology, University of Arizona Press, Tucson, 1955. 200 pp., 38 figs. $1.50.

This work was apparently written with primary reference to the Southwest and will doubtless serve as a text for courses at University of Arizona in geochronology. As a compact summary it will probably find wider acceptance as a student's reference. Ten of the 11 chapters are written by staff members of the departments of Anthropology, Botany, Geology, Physics, Chemistry, and Astronomy and of the Laboratory of Tree Ring Research; one chapter is by Ernst Antevs, the foremost authority on geologic-climatic dating.

E. F. Carpenter's chapter on "Astronomical Aspects of Geochronology" is a concise survey of what Zeuner calls the astronomical theory. Carpenter concludes, as does van Woerkom in *Climatic Change*, that this theory cannot adequately explain the causes of glaciation. The brief chapter by E. N. Wise, "Geochemistry and Radiochemical Dating," is concerned with theories of the formation of the earth and dating of rocks by helium, uranium lead, and other methods. The chapters "Geological Stratigraphy" by J. W. Anthony and "Paleontology" by J. F. Lance are expositions of principles in these fields. Lance is hopeful that by combining knowledge of the end-Pleistocene paleontological record with archaeological, pollen, climatic, and glacial chronologies we may realize a useful and reasonably exact paleontological succession which will serve archaeologists. E. B. Kurtz, Jr., and R. T. Anderson on "Pollen Analysis" give a brief review of the principles of occurrence, technic of analysis, and collection of samples. E. W. Haury on "Archaeological Stratigraphy" illustrates site stratification situations in the Southwest and their interpretation — the only criticism of this is that it is overbrief for such a varied and important subject.

Smiley writes on "Varve Studies" in an excellent chapter with adequate citation. The folded chart on paleoclimatic variations over the past 27,000 years is not bound in, and users of the book will probably find that the loose chart is difficult to keep in its proper place. Such charts should be either bound in the book or put in a pocket. Antevs in "Geologic-Climatic Method of Dating" discusses the nature of the geologic record, climatic history of the postpluvial, and illustrates the method by analyzing specific arroyo, lake shore, and cave archaeological sites which he has studied. Radiocarbon dating method is summarized by E. N. Wise who adds a bibliography of published works containing dates as of December, 1954. B. Bannister and Swiley in "Dendrochronology" give a concise review of principles, prerequisites for establishment of a treering chronology, field collecting, laboratory analysis, and problems concerning application of derived dates. J. E. McDonald's section on "Paleoclimatology" is brief, he discusses the basic theory and the difficulties in reconstructing past climates.

Insofar as it is within the reviewer's competence to judge, all of the contributions seem to be carefully and accurately done. Bibliographies of articles have usually been kept to a minimum, and it might be suggested that a useful appendix in the second printing would be additional references.

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Radiocarbon Dating. WILLARD F. LIBBY. With chapter by Frederick Johnson. 2nd edition, University of Chicago Press, Chicago, 1955. ix+175 pp., 11 figs., 7 tables. $4.50.

In the second edition of this book Libby presents the development of the carbon dating method in a masterful manner, describes the solid-carbon counting technic in meticulous detail, and briefly outlines the recent gas-counting methods. A list of 417 radiocarbon dates, determined in Libby's laboratory, includes a description of the provenience of each of the samples dated. The chapter titled "Reflections Upon the Significance of Radiocarbon Dates" by Frederick Johnson is well written and will be of interest and value to archaeologists.

Changes in the first chapter are a statement that not all neutrons formed from cosmic rays are retained on earth, a revision of the observed ratio of the abundance of C^{13} in inorganic carbon to that in biological carbon from 1.03 to 1.025, and a paragraph noting that carbon from plants living in water contacting ancient limestone has a specific activity below that of normal wood. As a result of the change in the ratio of the abundance of C^{13}, the calculated ratio of the abundance of C^{14} was changed from 1.06 to 1.05, the assay of inorganic carbon was changed from 16.2 to 16.1, and the average carbon inventory was changed from 16.1 to 16.0. The revised values were not substituted for the old values in one instance of each on pages 8 and 32. Revisions of Chapter 2 include 6 additional assay values from shell, a portion of a paragraph suggesting that the upwelling of deep-sea water may account for the low assay of clam shells from the Aleutians, and the noting and use of a value of 2.4 neutrons produced per square centimeter of the earth's surface per second instead of 2.6 as used in the first edition.

A paragraph in Chapter 4 is devoted to the production of acetylene for gas counting, and 2 paragraphs describe the preparation of carbon dioxide for proportional and Geiger gas counting. The 4 new pages in Chapter 5 include mention of improvements in the solid-carbon counting technic, the acetylene gas counting method, and the carbon dioxide proportional and carbon dioxide Geiger counting technics. Scintillation counting is covered by a single sentence, and the very interesting methane counting technic discussed by W. H. Burke of the Magnolia Petroleum Company at the

Andover Conference on Radiocarbon Dating is not mentioned. The dates listed are increased from the 252 of the first edition to 417, those from the United States and Canada increasing from 140 to 248.

Johnson discusses the magnitude of error to be anticipated in the radiocarbon dating method, and some of the controversies which have developed concerning published dates. He discusses the errors which may be due to incorrect collection technic and faulty interpretation of the location of samples. He insists that critical interdisciplinary evaluation of the samples and of the dates derived from them are necessary before the dates can be fully accepted. There is an evaluation of the dates relating to early man in Middle America and Peru and a discussion of those of archaeological and glacial-geological interest in North America. A page is devoted to the evaluation of Near Eastern and other Old World dates.

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4,000 Years Under the Sea. The Story of Marine Archaeology. PHILIPPE DIOLÉ. Translated from the French by Gerard Hopkins. Julian Messner, New York, 1954. xiv+237 pp., 3 figs., 16 pls., 1 map. $4.50.

This book may be something of a disappointment to archaeologists who are looking for factual material on what has been found under the ocean's surface and for the methods used to recover artifacts, to map sites, or even to discover them. In this sense the book leaves unsaid much more than it says. It was hoped that this review could be slanted towards a discussion of the methods used in marine archaeology in the Mediterranean with an eye towards their application to marine archaeology in the New World, but, unfortunately, Diolé ignores this aspect of the problem almost completely. Equipment is mentioned, if at all, only in the most casual way. For example, there is a small dredge that can be operated by one diver, but no indication of how the dredge is made, how it is powered, how it is used underwater, how much silt and sand it can move, how big it is, and so on. A knowledge of "skin-diving" technics, especially those using self-contained underwater breathing apparatus, is almost a necessity just to understand how the author got about underwater.

There is little doubt the Diolé has done a good deal of diving on various underwater archaeological sites and that he is a writer of much talent, but it is extremely difficult in many instances to get a clear or concise picture of the archaeological situation involved. Maps or sketches of the sites would be of great benefit. The chapter on the ports at Cherchel, for example, is confused and almost incomprehensible as the author attempts to sort out and describe 4 ancient submerged ports by written description alone; 2 aerial photographs are shown of the modern port and part of the coastline where the older ones are purported to be, but they are not much help for they are printed upside down. A reader not too familiar with the geography of the Mediterranean would be aided by area maps showing the locations of the various wrecks and drowned sites. More underwater photographs of the sites and of the divers working on them would add a great deal.

It must be admitted that Diolé writes very well and that the book does not suffer from translation. However, his Gallic lyricism and eloquence about the beauty of undersea life and discussions of how the sea and diving "spiritualize and fine down a man" should not be so overwhelmingly present even in a popular book on archaeology. Diolé seems to attempt to do for diving what Saint Exupéry did for flying.

Underwater archaeology is a new field even though the Mahdia wreck was explored by helmet divers as early as 1909-13. The use of self-contained underwater breathing units is bound to be a great stimulus because the lack of lines to the surface gives a diver complete freedom of motion. There can be little doubt that early man sites along the littoral as well as more recent prehistoric ones have been drowned by the rise in sea level since Pleistocene times — a rise that would appear to be continuing to the present as Diolé points out in one of the appendices of the book. It is the earnest hope of this reviewer, therefore, that American archaeologists who work in regions adjacent to our coastlines will give serious consideration to the possibility that much archaeological information may be present below high tide line, and either get in the water themselves or enlist the aid of local skin-diving groups whose members usually know the topography of the ocean bottom well. Many underwater sites and artifacts have been found off the coast of southern California by amateur divers while hunting for fish, lobsters, or abalone. The study of underwater archaeology has much to offer, although Diolé probably overstates the case when he says "to the archaeologist the sea is as generous as the land."

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Stone-Worker's Progress: A Study of Stone Implements in the Pitt Rivers Museum. FRANCIS H. S. KNOWLES. Pitt Rivers Museum, Occasional Papers on Technology, No. 6, Oxford University Press, Oxford, 1953. 120 pp., 24 figs. 15s.

Here is an introductory book on flint working for courses in primitive technology or beginning archaeology. The material is limited, but only because the author himself sets limits before he begins. Sir Francis discusses the various technics of stoneworking from crude flaking with a hammerstone to gunflint knapping with an iron hammer. Illustrations for technics and tool types are provided by examples from the Pitt Rivers Museum, the author's own experiments with quartzite hammerstones and bone and antler flakers, and observa-

tions of the methods of recent native stoneworkers.

Sir Francis successfully de-emphasizes unilinear evolution in stoneworking and points out that the crudest and most refined technics (not end products, but technics) have existed since the Lower Palaeolithic. He then traces the development of flaking technics and core types used in the manufacture of stone axes, spearheads, knives, and arrowheads. The problems involved in the shaping are well presented and fairly well illustrated. Although the definitions are not always the same as those currently used by American archaeologists, the illustrations clear up any terminological difficulties.

Chapter 8 should be of special interest to Americanists, for in his survey of "The Tools Used in Flaking Work by Modern Stone Age Peoples," the author emphasizes stoneworking by the Australian aborigines and the American Indians, and sketchily summarizes the writings of such men as Elkin, Catlin, Jockelson, Moorehead, and E. Nelson. The social implications of stoneworking, materials other than flint (including shell, shark's teeth, and bamboo), cautious evolutionism in the underlying ideas which bring about changes in technic, accidental discovery, diffusion, and individual inventive genius are among the other items considered.

Why study stone tools? Much is implied in Sir Francis's answer: "It is, above all, the lasting evidence of the skill, inventiveness, and artistry of the Stone Age craftsman."

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The Disposal of the Dead. C. J. Polson, R. P. Brittain, and T. K. Marshall. Philosophical Library, New York, 1953. xii + 300 pp. $7.50.

This book was written by instructors in forensic medicine at the University of Leeds as a comprehensive review of modern (primarily British) practices on the disposal of the dead. It is of undoubted value as well as interest to medical men, lawyers, officials, and funeral directors. The volume consists largely of proper procedures upon a death under English law and of details on cremation, embalming, and so on, as currently practiced. For an extraterrestrial anthropologist preparing a report on our culture comparable to our studies of peoples in earlier periods or with less complex culture, this would be a most valuable compilation of native practices (as would Habenstein and Lamers, 1955, *The History of American Funeral Directing*). However, despite the publisher's claims there is little of interest for the archaeologist. Sections of potential interest are a 13 page historical introduction which is very general but contains some interesting material on modern instances of ancient pagan practices such as mourning colors and chargers led following coffins — "as late as 1781 the burial of a horse with its owner is recorded in Poland"; and a 7 page chapter on the history of cremation in Europe where the practice was largely stamped out by the church from about the 4th century to the latter part of the 19th. There are also brief historical notes on embalming and coffins, and summaries of British laws governing exhumations and transport of the dead.

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Basic Readings on the Identification of Human Skeletons: Estimation of Age. Edited by T. D. Stewart and Mildred Trotter. Wenner-Gren Foundation for Anthropological Research, New York, 1954. iv + 347 pp., 66 illus., 84 tables, 40 charts.

This volume provides reprints with brief comments by the editors of 10 fundamental original articles — primary sources — which give data for the assessment of age by various means. It is a valuable contribution which can by no means be considered only a convenient compilation for students of physical anthropology, because as the editors point out in the preface: "The original investigators were seeking generalizations and biological principles; but they qualified their conclusions by giving all of the evidence. However, the subsequent compilers of these data, the writers of anatomical textbooks and identification guides, reiterated the generalizations and omitted the qualifications. It has been convenient, naturally, to use these compilations and thus misconceptions have been perpetuated."

In at least some of the textbooks and other secondary sources reservations are briefly stated but definite guides are laid out. The latter are what we want and are prone to use. Consequently, it would be well for the archaeologist to read at least the comments in this volume in order to know how limited are the data on which the tabulations and statements are based. Thus the editors comment that: "There are so few direct observations on age changes in skeletons and some of these are unreliable. For example, some of Stevenson's observations on epiphyseal union have been shown to be incorrect with regard to sequence and hence ages. Yet Stevenson is the only one who has reported detailed direct observations on this feature. Under the circumstances we have felt justified in republishing Stevenson's paper only by giving along with it Flecker's X-ray study of epiphyseal union in Australian whites." These and the other papers were reports of investigations, not intended as the final word or as providing rigid standards. A valuable new study of this sort is T. D. Stewart's paper on the age changes in the sternum (1954, *Amer. Jour. Phys. Anth.*, Vol. 12, pp. 519-35). Archaeologists have depended most on the closure of cranial sutures for age estimates. Todd and Lyon in their basic work on 514 white and negro skulls made no claim to provide a firm basis for precise determinations on individual cases. An examination of 2350 white and negro crania by Cobb indicates suture closure is a highly variable phenomenon (1955, *Amer. Jour. Phys. Anth.*, Vol. 13, p. 394). In short, "assessment regarding the precise age at death of any individual, gauged only on the degree of closure of

the vault sutures of the skull, is a hazardous and unreliable procedure" (Singer 1953, "Estimation of Age from Cranial Suture Closure," *Journal of Forensic Medicine*, Vol. 1, p. 59, Cape Town).

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Prehistoric Europe: The Economic Basis. J. G. D. CLARK. Philosophical Library, New York, 1952. xix+349 pp., 180 figs., 16 pls., 2 tables. $12.00

"This book is concerned with the ways in which early man, in competition with other forms of life, maintained himself on European soil since the end of the Pleistocene Ice Age, and with how he managed not merely to survive but to raise his standards from those of savages to those of peasants ready to support the full weight of urban civilization." From these opening words in the preface, the author takes his cue and follows his course through the traps and pitfalls of European archaeology from the close of the Palaeolithic to the threshold of history. The material is marshalled into an Introduction and 10 chapters: 1, Ecological Zones and Economic Stages; 2, Catching and Gathering: Inland; 3, Catching and Gathering: Coastal and Maritime; 4, Farming: Clearance and Cultivation; 5, Farming, Crops and Livestock; 6, Houses and Settlements; 7, Technology: Stone, Bronze, Iron; 8, Technology: Other Handicrafts; 9, Trade; and 10, Travel and Transport.

The Introduction is concerned with the sources of information — not only the imperishable stone and metal objects from the classification of which the skeletal structure of prehistoric societies has been developed, but also the perishables such as wood, leather, and fibers. As the latter class forms the bulk of the cultural inventory of any primitive people, the author points out that future excavations will have to be undertaken where conditions make its survival likely if archaeologists wish to increase knowledge of the content of early societies and give them life. Survivals among peasant societies in recent times, and descriptions in early historical sources are noted as other aids for interpreting archaeological discoveries. Another great source of information lies in the remains of plants and animals, all too frequently published as palaeontological data, but which could also furnish data bearing on the relative importance of each species, age of the animals at time of kill, and possibly information about seasonal activities of the people. "It is a cardinal thesis of this book that the economic life of early man can most fruitfully be considered in relation to the wider economy of nature."

Clark sees the economy of any community as the result of the interplay of 2 forces: — on the one hand, the physical needs, the capacities and aspirations, and the values of the populace, and on the other, "the character of the habitat, itself to a greater or less degree influenced or conditioned by culture." Four main plant formations — tundra and *fjäll*, the coniferous forest, the deciduous forest, and the Mediterranean evergreen forest — set permissive limits to the expansion of the several primitive economies. As centers of early civilization expanded, man's effects on the habitat became more and more pronounced. The Mediterranean and deciduous forests were either eliminated or greatly reduced in extent, losing their powers of rejuvenation as man's exploitation of the zones increased in intensity. The southern boundary of the coniferous forest established a limit beyond which it was not possible for farming to spread in prehistoric Europe. Even within the boundaries of the zone of farming, some elements of the old hunting-gathering economy persisted until intensive industrialization and exploitation rendered the country unsuitable for the former prey of the hunter.

Farming spread into deciduous forests in such a way that transition from the older to the newer way of life was very gradual. A census of wild and domesticated species represented among refuse bone from Neolithic sites provides a record of this change. Further analysis of refuse bone indicates that the most important domestic animals in the early Neolithic economy in forested country were the ox and the pig, for both can subsist in forest land, the former on browse and the latter on pannage. By Iron Age times, clearing of the land had so reduced forests that sheep had become much more important than swine. In certain treeless areas sheep were more common than either swine or cattle even in Neolithic times.

In dealing with advances in working stone and metals, Clark seems almost to be talking in terms of present-day economic problems. He points out very clearly that out of a supply of a new product, whether it be a superior stone ax or a bronze or metal tool, there arose such a demand that production was expanded until manufacturies were established on ever-increasing scales, and only superseded by improvements which arose in response to a demand. The role of trade in spreading new products and in stimulating imitations, at times in some other medium, is ably brought out.

This book might seem to offer little to those whose eyes are on immediate problems in the Americanist field, for it will supply no answers. It is, however, of fundamental importance in demonstrating the manner in which cultural advances spread across a continent from a reservoir to the south and east in which farming had already developed from a hunting-gathering economy. By more or less similar means, the use of metal was introduced at a later date.

The rapid expansion of men and their cultures into postglacial and prehistoric Europe must have been paralleled by expansion eastward to the New World. Although the American continents are far removed from the scene of this book, the theme seems as applicable here as in Europe. Such theoretical considerations are of primary importance if one would try to breath life into the dry sherds, stones, and bones with which an archaeologist works. Although the author mentions Siberia and the New World only in passing, those

whose interests lie in the northern part of the New World will find many familiar things in this book. It should supply food for thought for all of us.

The list of works to which reference is made — the author emphasizes the fact that it is not a bibliography — includes more than 700 titles, many of which will be unfamiliar to monolingual Americans. The illustrations, whether line drawings or half tones, are excellent, as is the typography. All in all, it is a fine book — not only stimulating, but exceedingly readable at the same time.

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A Reappraisal of the Fremont Culture, with a Summary of the Archaeology of the Northern Periphery. H. M. WORMINGTON. Supplementary reports by Norton H. Nickerson, Erik K. Reed, Albert H. Schroeder, and Gilbert R. Wenger. Proceedings of the Denver Museum of Natural History, No. 1, Denver, 1955. xii + 200 pp., 65 figs., 5 tables. $3.00.

This publication is a handsome example of the printer's art and a valuable contribution to archaeology. It is an admirable initial number of a new technical series from the Denver Museum. The museum authorities who decided to establish such a series deserve commendation and thanks from the scientists whose fields will be affected.

In this volume Wormington has 3 objectives: (1) a descriptive report of the Turner-Look village site, near Cisco, Utah, and 2 lesser sites nearby, where she conducted excavations in 1939, 1940, 1941, 1947, and 1948; (2) a survey and summary of the literature of the "Archaeology of the Northern Periphery"; and (3) an attempt to define the Fremont culture, to discover its origin, and to outline its relationships to other western cultures. The 2nd and 3rd of these objectives are of the greatest general import.

Although the Turner-Look site is perhaps not typically Fremont, it seems to be correctly allocated by Wormington to that culture. It was a small nondescript village of 9 structures, most of which were round houses with coursed stone masonry and vaulted walls. Coursed adobe loaves were used in certain auxiliary structures. Artifacts are none too numerous, but are generally of Fremont type. Pottery is predominantly (88% of total) a plain gray with crushed calcite temper, which Wormington has named Turner Gray. She recognizes 3 varieties of it. Trade sherds and corrugated ware account for the other 12% of the pottery. She dates the site at A.D. 1050 or slightly later, on the basis of the trade sherds.

In Part 2 Wormington first defines the "Northern Periphery" (a term which completely distorts present day knowledge about the cultures of the region, as I have elsewhere argued) and establishes a series of subdivisions within it. Essentially she sees the "Northern Periphery" as having 3 subdivisions: A, the Virgin, Paria, and Escalante drainages of southwestern Utah and Northern Arizona; *B*, Utah west of the Wasatch; and C, eastern Utah and western Colorado.

Her abstracts of the literature are well done; they are accurate except for minor errors which are sometimes referable to the original author rather than to Wormington. This section will prove useful to students on all levels, because Wormington has pulled together in one place the gist of all the literature pertinent to the Fremont culture. In my opinion the section would have been twice as useful, however, if Wormington had given just one sentence of evaluation, or her opinion, on the validity or accuracy of each report. Surely she has an opinion, and unless she, as an authority, doesn't give the reader a clue, in most cases he is forced to go to the original source, not for data but to assess the validity of data.

Further, I think it is a pity that Wormington ordered her thinking and her research along the outmoded and inaccurate lines of the 1930's. Specifically, she seems to accept such terms as "Northern Periphery," and "Puebloid" as eternal verities, even though the terms derive from the idea that the full range of cultures north of the Colorado River were demonstrably descended from and are later than the San Juan Anasazi. This view has been rooted in dogma, not evidence, and the sooner the terms die out of use — as the concept long ago has — the easier it will be to solve the problems of the relationships of the San Juan Anasazi culture to those of Utah. Wormington knows — witness Part 3 of this volume — that the history of the Fremont culture is only briefly tied in with the San Juan Anasazi; further, she demonstrates in Part 3 her awareness that the Fremont (east of the Wasatch) and the Puebloid (west of the Wasatch) cultures are very like one another. These relationships are obscured by the continued separation in terminology. For practical purposes, the Fremont culture, as first described by Morss, can be recognized from Yampa Canyon in Colorado to Willow Beach in Arizona. Moreover, as Wormington correctly points out, the sites west of the Wasatch show greater contact with Anasazi than do those in the area where Fremont was delineated. The major point here is that the prewar approach used in the present volume further confuses these facts, instead of clarifying them.

Part 3 is the most valuable part of the volume. Here Wormington defines, trait by trait, what Fremont culture is, what of Anasazi is to be found in it, and whence the Fremont culture sprang. I find her discussion, first analytic and then synthetic, of the trait combinations which comprise the unique Fremont culture stimulating, accurate (so far as I can see), and very valuable. But as she moves on to derive certain elements such as pictographs and shields from the Plains, pottery from the Moapa Valley, or corn, figurines, and maybe feather headdresses from Mexico, I can't follow her and my enthusiasm quickly wanes. These speculations push the puny data much too far; they are unwarranted. However, Wormington herself realizes the weakness of some of her interpretations (Fremont-Hopi

connections) when she labels her remarks (p. 189) as conjecture ". . . offered as a possible hypothesis which may suggest new possibilities and perhaps stimulate further work."

She is, I think, completely right when she explains the origin of the Fremont by saying (p. 180): "Comparative data would suggest that the Puebloid and Fremont cultures sprang from the same variant of the generalized Basin cultures and that both acquired certain Anasazi traits. . . ." I would go one step further and say simply that the Fremont culture found over most of Utah is an older generalized Basin culture modified by brief Anasazi contacts.

The results of 2 years of survey and excavation carried out in east-central Utah by the University of Utah and the University of California at Los Angeles cannot be introduced here, but we can say that there is much new evidence in hand and in manuscript which will tend to strengthen and greatly extend Wormington's basic views in what is a quite successful attempt to forward our knowledge of the Fremont culture. The most important sentence in the book, the thought that will provide the key to understanding it, is the last in the volume: "One thing as least seems certain, the culture of the Fremont people cannot be regarded simply as an attenuated peripheral manifestation of that of the San Juan Anasazi."

Although I have criticized Wormington for allowing the dead weight of past poor judgment to constrict her thinking, I wish to close by saying that this book should be read by all whose interests lie in Southwestern archaeology, and by anyone who wishes to startle his mind with a couple of new ideas. This is a good study and it will be consulted for some time.

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The Sobaipuri Indians of the Upper San Pedro River Valley, Southeastern Arizona. CHARLES C. DI PESO. With the collaboration of Arthur Woodward and Rex E. and M. Virginia Gerald. The Amerind Foundation, No. 6, Dragoon, 1953. xii+285 pp., 34 figs., 92 pls. $7.50.

This excellent report is based on archaeological field work by the Amerind Foundation at 4 sites in the San Pedro River valley. But since Di Peso has made extensive use of ethnohistorical sources to reconstruct the way of life of the Sobaipuri Indians who occupied these sites, this monograph is much more than a series of site reports. It is an important contribution to the culture history of the Southwest. The typography and layout are excellent; the reproduction of the plates and figures is good. The many charts, which are frequently pictorial, help the reader to visualize the material objects in their historical sequence. However, the scale used on the directional arrows in the plates is nowhere given, so that measurements cannot be readily determined.

In the 1st chapter Di Peso locates the sites which were excavated, sets forth the purpose of the research, reviews the problem of the time gap, A.D. 1400 to 1700, discusses the origins of the Sobaipuri, and using the Spanish historical sources reconstructs their material and nonmaterial culture. In the 2nd chapter he outlines the history of Spanish contacts with the Sobaipuri, and in the 3rd, provides a discussion of field methods employed in the excavations and in the associated archaeological survey.

The description of the architecture of the Sobaipuri is based on both the archaeological findings and the ethnohistorical sources. Many of the raw data are printed in small type so that someone who does not have access to the collections has the essential material for further synthesis and comparison. This method of presentation is a successful solution to the problem of providing in the same publication both the details needed by the specialist and the general material which the nonspecialist wants. Di Peso follows this same pattern of presentation in the chapter on arts and crafts. The value of publishing the basic data cannot be overemphasized, for they constitute the permanent result of the excavation; the interpretive sections and the theoretical generalizations are also important and necessary, but they may change with the next shovelful of earth.

In the 6th chapter, Arthur Woodward and Di Peso collaborate on an excellent discussion of the various articles of Spanish origin which were traded into Quiburi, providing important details on the manufacture and use of these objects. Barton Wright's drawings of these reconstructions of the Spanish artifacts add a great deal to the presentation. In the section, "Foodstuffs of the Sobaipuri," Di Peso skillfully blends the archaeological evidence and the historical accounts. The remarkable speed with which the Sobaipuri took over domestic animals is clearly attested by the ratio of wild to domestic animal bones in the refuse. There was a change in burial practice from cremation to inhumation, probably as a result of Spanish influence. The somewhat meager human skeletal materials were studied by Rex E. and M. Virginia Gerald. A useful feature of the summary is the inclusion of the methods and formulae which they used.

Di Peso concludes with a detailed analysis of the sequence of cultural development in the San Pedro Valley and the relationships of the San Pedro peoples to other groups. He sees the Sobaipuri as the end product of an indigenous development which began in Cochise times. He recognizes a period of strong Mogollon influence prior to A.D. 700, which was followed by an increasing domination by the River Hohokam and a final blending with the Salado. He restates these detailed conclusions and interpretations in a general summary.

The validity of much of Di Peso's reconstruction of events in southern Arizona depends on his contention that Gila Polychrome continued to be used into historic times. This in turn rests largely on the identification of the site of Baicatcan. The Sobaipuri moved from

Baicatcan to Quiburi in 1692. His identification of this site is based on 2 assumptions: that the location is correct, and that the cultural complex forms a continuum with Quiburi. The pottery at "Baicatcan" consisted of plainware "similar to Sobaipuri Plainware" (p. 63) and "late" Gila Polychrome (46.97%, p. 274). At Quiburi only 2 sherds of Gila Polychrome were found; these were in the trash "in association with Spanish metal, ceramics, etc. . . ." (p. 262). To this reviewer it seems incredible that Sobaipuris living at Baicatcan in 1692 and using 47% Gila Polychrome should virtually stop using this type in moving to Quiburi. This is not to argue that prehistoric Sobaipuris may not have used Gila Polychrome, but that the evidence for the identification of Baicatcan, and hence for closing the "time gap," is not yet convincing.

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The Jaketown Site in West-Central Mississippi. JAMES A. FORD, PHILIP PHILLIPS, AND WILLIAM G. HAAG. Anthropological Papers of the American Museum of Natural History, Vol. 45, Pt. 1, New York, 1955. 164 pp., 57 figs., 8 pls., 15 tables. $3.00.

Jaketown, a long-occupied Indian site, is located in the alluvial plain of the Mississippi River. This valley is characterized by a complex pattern of ridges, swales, and lakes which represent former levees, sandbars, and channels of the meandering river and of its eastern tributary, the Ohio. The geological history of these rivers' successive swings is known and the levees representing various stages have been given individual designations. The Jaketown site is situated on a sandbar of the old, C_1 course of the Ohio River, which was later built up into a levee. This factor is of considerable importance in the history of the site as the earliest occupation, the Poverty Point period, seems to have been contemporaneous with the building of the levee. Midden material rests on sandbar deposits, is mingled in places with levee deposits, and more important, is vertically separated by sterile zones of water-deposited levee building material.

The site consisted of 3 major mounds, a series of smaller ones, and large surface areas with concentrations of artifacts. Of greatest interest were the numerous fragments of baked clay Poverty Point objects and thousands of microflint tools. Pottery wares indicated occupation in the major periods of the area: Tchula, Baytown, and Mississippi.

In 2 seasons of work 7 excavations were made. A series of bore-hole traverses yielded data as to the extent of the earlier deposits and aided in the reconstruction of the geologic history of the site. The results of this work confirmed the periods of occupation suggested by the surface material, but indicated that occupation was not continuous and that the earlier period, Poverty Point, was the most extensive.

The heart of this study is the section on stratigraphy with careful and detailed discussions on the excavations and on the relationship of the artifacts to each other and to the physiographic features of the site. An interesting concept of MVP, "Mean Vertical Position," is utilized as an aid in the interpretation of small samples. It would appear to have considerable value to other workers, perhaps more than was achieved here. A colored overlay for two of the excavation profiles ties together the cultural and stratigraphic picture.

A series of 6 major problems of stratigraphic implication was formulated. (1) The first "stratigraphy within the Poverty Point Period" is demonstrated by differences in the frequency of certain forms of baked clay objects during the time span of the earliest occupation. (2) "The relationship of the Poverty Point and Tchula Periods" is incompletely answered, but the writers do not believe that continuity between the two is demonstrated at this site. Further, no pottery vessels were present in Poverty Point and the typical clay objects of that period were not used in the Tchula Period. (3) One of the features of the site was a mass deposit of baked clay "tetrahedrons," which are stratigraphically and typologically distinct from the Poverty Point baked clay objects. These appear to date from the Tchula period. (4) The problem of Tchula-Baytown relationship is resolved by the authors' decision to postulate a ceramic continuity between the two as a working hypothesis. (5) The site adds few new data on Baytown but tends to confirm the previous internal picture of that period. (6) The authors are satisfied that there was a break in occupation here between the late Baytown and Mississippi periods.

Probably the major result of the work is the filling out of the cultural picture of the Poverty Point period. It is now clearly seen as a complex without pottery vessels, although characterized by the numerous clay objects, presumably used for "stone-boiling" or as baking pit "stones." The microflint industry is also definitely a part of the complex. This is believed to be related to Old World Mesolithic flint working traditions although there is disagreement as to the exact history of such relationship.

There are 2 possible ways of dating the initial occupation. The association with the C_1 channel of the Ohio River would place the beginning of the Poverty Point deposits about 1500 B.C. There is a radiocarbon date of 400 B.C. based on a single sample from the earliest part of the Poverty Point refuse. The authors do not choose between the 2 dates but point out that the cultural data fit better with the more recent one.

The cultural placement of Poverty Point is clearly late "Archaic." There are similarities between Poverty Point and other archaeological cultures; the strongest are with Hopewellian. Although there is no agreement as to the exact nature of this relationship, the senior author goes on record with a guess that the culture "may possibly represent an early southward thrust of the mid-continent Hopewellian culture."

The authors deserve praise for the competent manner in which they have handled such a mass of material, some of it relatively new and never handled by analysis before. Sections of the paper were prepared by each author, with all joining in the conclusions. As in the *Archaeological Survey of the Lower Mississippi Alluvial Valley*, when unanimous conclusions were not reached, the opinions of the dissidents were carefully recorded. Moreover, they have maintained throughout a proper air of objectivity in the use of their analytical tools, especially those related to ceramic typology. This is one of the most refreshing aspects of the study as all to frequently the true nature of this analytical equipment seems to become obscured to many Southeastern archaeologists.

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Prehistoric Pottery of the Eastern United States. Edited by JAMES B. GRIFFIN. University of Michigan, Museum of Anthropology, Ann Arbor, 1950-1954. Issued in parts. Illus. $2.50 (to date, by subscription).

Archaeological papers in which pottery is described are being published in this country in increasing numbers. It becomes difficult, therefore, for an archaeologist in one area to compare his ceramic material with that of other workers. The need to bring together material of this sort has been felt for a long time in the Southwest where Hawley, Hargrave, and Colton have tried to fill the need. James B. Griffin is to be congratulated on his endeavor to bring together in an organized form, descriptions of pottery types from the eastern seaboard states and the Mississippi Valley.

In his introduction, Griffin states:

> This series, devoted to type descriptions, summaries of ceramic groups, and other information pertinent to the archaeology of the area is a logical outgrowth of some twenty years' concentration on the prehistory of the eastern United States at the University of Michigan. This series is designed as a service publication to make promptly available new type descriptions, revisions of old descriptions, and other information not to be included immediately in a more permanent medium. It is hoped that over a period of years most of the type descriptions can be gathered together in this series. These papers are loose leaf and thus can be arranged in any desired order. Corrections or additions to the type series can be readily inserted in their correct position for rapid reference rather than kept in their order of issue.

The material is offset printed on both sides of 8½" by 11" pages which are standard punched to fit a 3-ring loose leaf binder. Each type description starts a new page and includes abundant illustrations, other pages being added where required. This method allows any classification of types that the worker desires but does not aid the librarian to classify the sheets as they appear, or the bibliographer to cite a reference. Each page, at the top left-hand side, bears the title of a type, followed by a serial number of the type within a "series" or "ware" and the page number for the type. Below this line is an abbreviated date (month and year), but there is no indication whether this date refers to when the paper was written, accepted for publication, or published.

As issued at the present time, the publication includes a brief introduction followed by the descriptions of 53 pottery types. These are treated in 2 parts, prehistoric (49 types) and historic (4 types). Each group of pottery descriptions, loosely called a series, is followed by a bibliography. The titles and authors of the 10 papers published so far are:

The Contribution of Technical Ceramic Studies to American Archaeology by F. R. Matson; *The Central Mississippi Valley Archaeological Survey, Season 1950* by J. B. Griffin and A. C. Spaulding; *Fiber-Tempered Pottery of the Southeast* by W. H. Sears and Griffin; *Certain Sand-Tempered Pottery Types of the Southeast* by Griffin and Sears; *Fabric-Marked Pottery in Eastern United States* by Sears and Griffin; *Four New Owasco Pottery Types in New York* by W. A. Ritchie; *Woodland Pottery of Northeastern Oklahoma* by D. A. Baerreis; *Bayou La Batre Tchefuncte Pottery Series* by S. B. Wimberly; *Pottery Types of the Over Focus, South Dakota* by W. R. Hurt; *Certain Eastern Siouan Pottery Types* by J. L. Coe.

This is a valuable work and should merit the cooperation of all archaeologists in the area, yet it might be improved if the editor prepared a system of classification to be followed by librarians and bibliographers. If this were supplied, the flexibility of the loose leaf system would not be impaired and an individual archaeologist would be free to devise his own arrangement of the type descriptions if he disagreed with the editor's classification.

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A Ceramic Study of Virginia Archeology. CLIFFORD EVANS. With Appendix by C. G. HOLLAND. Bureau of American Ethnology, Bulletin 160, Smithsonian Institution, Washington, 1955. viii + 195 pp., 23 figs., 30 pls., 1 chart. $1.25.

This monograph on Virginia archaeology is "the first major attempt to pull together the pottery of the entire area into one study." It is Evans' first work on eastern archaeology, and it profits from his background of fieldwork in other areas. He combined a statewide survey and a limited amount of excavation with a study of collections, including those made by Bushnell, Fowke, Holmes, and others in the United States National Museum. The ceramic seriation is based upon the quantitative method espoused by Ford and employed with success elsewhere in the Americas for the study of surface collections of pottery. Evans does not use the Midwestern Taxonomic System. C. G. Holland independently used the same quantitative technics in his study of projectile points.

A total of 24,047 sherds from 96 different sites comprise the study. The sites are widely scattered throughout Virginia, but there are still many blank spots. Some

of the sites are poorly represented and there is little stratigraphy. Evans proposes 5 ceramic areas which are based primarily on the late pottery cultures. These ceramic areas are roughly equivalent to the "mountain," "piedmont" (with 3 subdivisions), and "coastal" areas in Holme's *Aboriginal Pottery of the Eastern United States*. Evans cautiously leaves the correlation of his ceramic areas with historic groups to ethnohistorians. However, a comparison of his ceramic map with Swanton's tribal map (1952, B. A. E. Bull. 145, Map 5) shows a tolerable agreement between certain tribal zones and the ceramic areas. Distribution maps would have been a valuable addition for each culture period. Lamentably, the figures are much reduced in size because of the format. Apparently because of excavation technic the stratified Potts site presents a strained kind of interdigitated seriation. The publication of Carl Miller's forthcoming River Basin Surveys monograph undoubtedly will provide further clarification on the Clarksville area. Miller excavated several seasons in Late Woodland sites and found upwards of 100,000 sherds. His study will serve to test Evans' seriation in that particular part of Virginia.

Especially valuable is the "Comparative Analysis of Surrounding Areas and Virginia." Schmitt's *Archeological Chronology of the Middle Atlantic States* written in 1947 was published too late (1952, in Griffin, ed., *Archeology of Eastern United States*, pp. 59-70) for consideration by Evans. Nevertheless, there are no marked discrepancies between the 2 studies other than some use of different pottery names. Holland's sequence, based on 3055 stone artifacts from 41 of Evans' 96 sites, corroborates the ceramic sequence. His method of analysis is a unique one and should repay study and application in other areas. The main conclusion is that Virginia is a kind of marginal area of Woodland complexes, with later influences from the Hopewellian and Mississippian cultures. Where only broad generalizations have been previously made regarding Virginia archaeology, Evans can point to detailed summations. These show that in some areas, the aboriginal cultures of Virginia had a long history of provincialism with very little change, while other ceramic areas show the results of contact and diffusion from bordering areas. Certain it is, that had this work been available earlier, the reviewer would have found it very useful in his surveys on the New River in Virginia.

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Bulletin of the Texas Archeological Society, Volume 24. Edited by ALEX D. KRIEGER. Texas Archeological Society, Austin, 1953. 226 pp., illus. $5.00.

The Texas Archeological and Paleontological Society changed its name to the Texas Archeological Society in 1952. This volume is the first in the series to appear under the new name. It contains one paper on a dating technic and 7 on archaeological sites in Texas, Oklahoma, Louisiana, and Coahuila. These 8 articles are important contributions which are well written and well illustrated, but 6 of them would have been much improved by the inclusion of area maps, and 3 by site maps.

In "Speleothem Age Dating" Phil C. Orr reports on attempts to date artifacts and human bone on the basis of the growth over them of ". . . 'cave formation' including stalactites, stalagmites and dripstone, etc." Orr uses material from Moaning Cave in California to measure the rate of growth. On the basis of known ages of 29 and 70 years for the growth on nails and a miner's pick, he calculates that the 420 mm. of cave formation on a human bone represent a minimum age of 12,000 years and a maximum of 50,000. However, the metal artifacts provide only partial control. There is no way of knowing whether the growth rate is constant through time or the same on various surfaces; Orr states that the growth on opposite ends of the pick is unequal. While this dating technic is a promising one, the many unresolved problems suggest that the dates from Moaning Cave should be "taken with a grain of salt."

"The Bellevue Mound: A Pre-Caddoan Site in Bossier Parrish, Louisiana" is a detailed report of the excavation of a burial mound by Robert L. Fulton and Clarence H. Webb. This is one of the few early pottery sites so far excavated and reported for the Caddoan area. The site consists of a 10 foot-high, conical mound built on a natural knoll. The authors assign it to a Burial Mound II or Middle Woodland horizon and see a development directly out of a Late Archaic with no intermediary or Early Woodland stage represented. The predominantly undecorated pottery was analyzed by J. B. Griffin who suggests a Marksville affiliation.

"The Sam Kaufman Site, Red River County, Texas" by R. K. Harris reports on salvage excavations at a site northwest of Texarkana which is being cut away by the Red River. Eleven extended burials each contained 2 or 3 vessels of typical Caddoan forms. The presence of some turquoise ornaments suggests Puebloan trade. A few glass beads found with 2 vessels "resembling" Nash Neck Banded suggest European contact as well as contemporaneity with either the Texarkana or the McCurtain focus, both considered fully prehistoric. Harris concludes that the site is a late McCurtain focus component which lasted into earliest contact times.

"The Morris Site, CK-39, Cherokee County, Oklahoma" by Robert E. Bell and Charlene Dale is a compact report on a project of the River Basin Archeological Salvage Program at a double component site in Tenkiller Ferry Reservoir. The earlier component is assigned to the Archaic wtih dates of 2000 to 5000 years ago, but no features and only a few artifacts were found. The suggestion that the later component represents a poor-cousin offshoot of Gibson aspect people struggling on into Fulton aspect times, some 400 to 600 years ago, sounds reasonable. One wonders why the 2 major pottery types are described but not named, while in a note one is identified as "the same as Woodward Plain" and the other "similar to Williams Plain."

"The Brown Site, Gd-1, Grady County, Oklahoma" was in preparation by Karl Schmitt at the time of his death in 1952 and has been completed by Raymond Toldan, Jr. The paper deals with a late prehistoric site in the Washita Valley near Norman. The materials have a definite Plains appearance, though some items are reminiscent of the Caddoan area. Pottery is predominantly Lindsay Plain (which Schmitt once remarked should be called "junk tempered" because it contains bone, shell, sand, clay, limestone, or anything handy), Nocona Plain, and Woodward Plain, all good southern Plains types. This site and the nearby Lee site are assigned to the Washita focus with a terminal date of about A.D. 1600. Trade sherds suggest relationships with Antelope Creek focus to the west and the Sanders-Spiro foci to the east.

Charlie R. Steen presents an appraisal of the Deer Creek site on the Arkansas River in north central Oklahoma and the Spanish Fort site on the Red River in north central Texas and adjacent Oklahoma in "Two Early Historic Sites on the Southern Plains." His report is based on an examination of early documents, a study of artifact collections, and visits to both sites. Steen suggests that the Indian culture resembles Henrietta focus material and that the sites were winter quarters for French hunters supplying meat to Louisiana in the early 18th century. He urges excavation and full reporting of these sites in order to furnish data on the beginnings of acculturation on the southern Plains.

"Excavations at the Blum Rockshelter" by Edward B. Jelks is another contribution from the River Basin Salvage Program. Jelks identifies the occupation as that of a single Central Texas aspect group intermittently living in the shelter over a period of several centuries prior to European contact. How long before contact is not known but at least long enough for 18 feet of terrace fill to accumulate over the earliest signs of habitation.

Pablo Martínez del Río makes the basic data on an important excavation in the Bolsón area of southwestern Coahuila near the town of Delicias immediately available in "A Preliminary Report on the Mortuary Cave of Candelaria, Coahuila, Mexico." This nonhabitation cave produced a large inventory of perishable remains but no evidence of food. Skeletal remains reveal a long-headed people of medium stature, without cranial deformation. The author discusses a temporal position that may be as recent as the 17th century mission period or many centuries earlier. He points out the similarities to materials from other sites in the Bolsón, to Basketmaker, and even to the southeastern Oregon finds in the northern extremities of arid America.

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A Woodland Site Near Chatham, Ontario. KENNETH E. KIDD. Transactions of the Royal Canadian Institute, Vol. 30, Pt. 2, Toronto, 1954. Pp. 141-78, 15 figs.

This is a summary report on the excavation of the Krieger site, a Late Prehistoric occupation in southwestern Ontario, conducted by Kidd for the Royal Ontario Museum of Archaeology. This paper is well organized and the maps and illustrations enable the reader to follow the text with ease. The discussion of the artifacts indicates that a variety of projectile point forms and pottery decoration technics were being utilized by the occupants of the site. The technics of pottery decoration are particularly interesting because of the wide range of combinations exhibited by individual sherds. The pottery decoration includes: incision, linear stamp, dentate stamp, complicated stamp, cord-wrapped stick or paddle-edge impression, and punctation. Krieger Incised and Krieger Stamped are the only pottery types defined.

The variety in the cultural evidence makes it difficult to understand Kidd's interpretation that this site represents "a single population unit and a restricted time span, i.e., a homogeneous culture." The lack of extensive reports on the occurrence of this culture in Ontario makes any interpretation problematical. However, it would seem that a culture undergoing rapid change is indicated for the Krieger site, and perhaps also for those with which Kidd notes similarities: the Uren site in Ontario, the Younge and Wolf sites in Michigan, late Owasco sites in New York, and the Monongahela sites in southwestern Pennsylvania.

It is obvious that careful excavation and study preceded the writing of this paper. This included the study of important local collections. The Late Prehistoric is an important period in the archaeology of the eastern Great Lakes region, and it is hoped that additional reports of this type will be published soon.

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Geschichte der Altamerikanischen Kulturen. HANS DIETRICH DISSELHOFF. R. Oldenbourg, Munich, 1953. 376 pp., 25 figs., 40 pls., 10 maps. DM 25.

Here at last is a comprehensive, well-written, and attractive book designed to give the German-speaking public a survey of the historical development of the pre-Columbian cultures of Middle and South America. The author, a research associate of the Ethnographical Museum in Munich and formerly a curator of the American section of the Berlin Ethnographical Museum, has conducted several excavations in Mexico, Peru, and Ecuador, and thus writes with authority. He is well versed in the most recent developments in the field, so that this book is a pleasant change from the many recent German publications which through naïveté or misrepresentation have given a strangely distorted idea of the cultural development of the aboriginal New World, such as W. Cordan's *Mexiko* (Düsseldorf, 1955).

Disselhoff's book is divided into 4 sections, the 1st treating the preceramic stages of the New World; the 2nd devoted to Mesoamerica, including the Archaic or Formative, Teotihuacan, the Toltec and Olmec problems, the development of Maya and Aztec culture, and the Zapotec, Mixtec, and West Coast cultures; the 3rd dealing with the intermediate region of Costa Rica, Nicaragua, Panama, Colombia, and Ecuador, with a particularly good chapter on metallurgy; and the 4th devoted to Peru. An appendix contains a discussion of technical and theoretical problems in the dating of archaeological remains in Midle and South America. Most of the latest radiocarbon dates for this area are included and the method itself is explained in non-technical terms.

The illustrations are well chosen. Since they present in the main archaeological specimens from the Hamburg, Stuttgart, Munich, and Berlin museums, they should be of particular interest to American archaeologists. In the caption of Plate 10 the reconstructions of the Maya cities of Copan and Palenque by Carlos Vierra have been confused and the names reversed. The selected bibliography contains primarily Spanish and German references; the important works in English by Ekholm, Kidder, Willey, Shook, Proskouriakoff, and others are largely overlooked. This is regrettable but perhaps understandable, since the book is directed toward German readers who would probably find it difficult to secure and read technical publications in English.

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La Serpiente Emplumada; Eje de Culturas. JOSÉ DIAZ-BOLIO. Registro de Cultura Yucateca, Merida, 1955. 211 pp., 50 pls.

The mysterious figure of Quetzalcoatl, the "feathered serpent" creator god and legendary culture hero of Mesoamerica, has always fascinated students of America's past, particularly those with a romantic turn of mind. A considerable speculative literature has accumulated, much of which is practically valueless from a modern critical point of view.

This most recent contribution to the Quetzalcoatl literature is a long, often involved dialectic (including Aristotelian syllogisms) which boils down to the thesis that the feathered serpent was accorded its pre-eminence as the all-pervading symbol of Mesoamerican supernaturalism when the notion arose that the rattlesnake in effect "counts time" by yearly adding a new rattle to his tail. Thus this creature, already mysterious and fearful because of his toxic fangs, came to be regarded as a kind of repository of esoteric wisdom. From this basic hypothesis stem the author's other chief ideas: the feathered serpent is always a rattlesnake; all Mesoamerican representatives of rattlesnakes denote the feathered serpent; the fundamental significance of the symbol is solar. In addition, he maintains that both the feathered serpent concept and the calendar it symbolizes were Maya inventions which diffused out from the "Old Empire" to Mexico and Yucatan. He arrived at his basic theory, he tells us, through a kind of sudden intuition while standing before a sculptured lintel at Chichen Itzá. His one concrete support is his citation of the modern Yucatec Maya folk belief that the rattlesnake adds a new rattle each year.

A good part of the book is devoted to a lengthy discussion of the significance of more than 50 motifs in both Classic and Postclassic Maya art which Diaz-Bolio believes form a kind of feathered serpent complex. The presence of almost any part of this complex seems to be enough to denote the whole feathered serpent cult. However, non-Maya feathered serpent symbolism receives little attention. The Quetzalcoatl legend in the documents includes considerable non-Maya material, but such fundamental central Mexican sources as the Anales de Cuauhtitlan, the Leyenda de los Soles, the Histoyre du Mechique, the Juan Cano Relaciones, and the Codices Vaticanus A and Telleriano-Remensis are utilized little or not at all. It is instructive, therefore, to compare the method of this book with Robert Rands's recent thorough work on the water motif in Mesoamerican art.

Many, if not most, of the hypotheses offered by Diaz-Bolio will probably be rejected by Mesoamericanists, principally on the ground of strained analogy and insufficient evidence. Some of his more novel ideas will serve as examples: the presence of a "round temple" in Peru demonstrates the existence of the feathered serpent concept there (pp. 30, 120); the feathered serpent practically monopolizes "Old Empire" Maya art (caption, Pl. 19); the masks of Temple E-VII-sub at Uaxactun represent the feathered serpent (p. 48); the emigration to Yucatan was the result of a mystically derived movement along "la ruta solar" (pp. 67-8); the round temple of Cuicuilo was dedicated to the feathered serpent (p. 108); the Maya filed their teeth and deformed their skulls to resemble snakes (p. 198); and the colors of the 4 world directions were derived from the various colors on the body of the rattlesnake (p. 200).

The book contains a number of errors of fact and interpretation. Examples are: (1) Plate 38, which is identified as "Estela 40, Petén, Guatemala," is a Yucatecan mask panel, apparently from the east facade of the Monjas east wing at Chichén Itzá; (2) the "T" element in the name-glyph for Coatlinchan is seized upon as "prueba . . . concluyente" that this element, wherever found, represents a stylized rattle despite the fact that nearly all stylized houses in Aztec art contain this "T" element; (3) the "tocado de Serpiente Emplumada" illustrated in Plate 40 is not from the Codex Nuttall but the Codex Borgia and apparently represents a stylized butterfly, as Caso has demonstrated.

The omission from the bibliography of the works of Förstermann, Schellhas, Gordon, Tozzer and Allen, Beyer, Pollock, Proskouriakoff, Jimenez Moreno, and Armillas is significant. Seler is represented by one

article and Thompson by 2 popular books. Spinden's *Study of Maya Art* is listed but little used while certain works cited in the text are not listed at all.

To the author's credit are his stressing of the occasional presence of the feathered serpent motif in Classic Maya art, though his choice of examples will be criticized; his inclusion of many original photographs particularly of Yucatecan sculptured facades; and his possibly accurate identification of certain serpentine motifs which had previously been neglected. His book is an interesting addition to both the literature of Maya symbolism and the more theoretical and speculative type of thinking on the "Quetzalcoatl problem."

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Magic Books from Mexico. C. A. Burland. King Penguin Books, No. 64, Penguin Books, Harmondsworth, 1953. 31 pp., 1 fig., 16 pls. $0.95.

As we read on the jacket, "never before have the works described in these pages been introduced to the general public . . ." In addition the excellency of the color reproductions of pages and figures from Mexican codices make this little book a valuable and useful contribution. The codices represented are: Telleriano, Vaticanus 3773, Rios, Magliabecchi, Borgia, Fejervary-Mayer, Cospio, Laud, Vindobonensis, and Zouche-Nuttall.

Burland distinguishes between historical codices and "poetic and semi-religious ones." He assigns the Mixtec codices to the former group and the Borgia Codex to the latter. However, he considers that the other books in the Borgia group, the Vaticanus 3773 and the Aubin Tonalamatl, "deal with the complexities of fortune-telling" and that they "have a certain horrid fascination that comes from their association with witchcraft." Such an emphasis on black magic is questionable; to treat the codices as no more than the books of fortune tellers gives a distorted picture of Mexican religion. Moreover, in a popular work of this kind, such an approach should be substantiated by a simple outline of the functioning of the *tonalpohualli* and its relation to the principal deities of the Mexican pantheon.

The plates which illustrate the importance of black magic and fortune-telling include 3 of Tezcatlipoca and 5 of other Lords of the 13 days and of the cardinal points. The other plates represent the ceremony of making the sun rise, Quetzalcoatl and the giving of his power, the dedication of the great temple, birth of the Mixtec people, 8 Deer, and the 4 fortunes of maize. Burland's notes on the post-Columbian codices are taken from the Spanish annotations on the documents; he follows Seler's methods in explaining the prehispanic ones. In each case he has added a certain amount of general information. Both his introduction and his notes are entertainingly written. However, his versions of the creation myth and the migration legend are rather strange mixtures.

Burland tries to convey a general picture of Mexican culture despite the fact that his choice of plates stems primarily from his interpretation of the codices as books of black magic. Probably no 2 persons would agree on which 16 plates to include if confronted with the task Burland undertook. His approach is both personal and novel.

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La Venta, Tabasco. A Study of Olmec Ceramics and Art. Philip Drucker. Special sections by Waldo R. Wedel and Anna O. Shephard. Bureau of American Ethnology, Bulletin 153, Smithsonian Institution, Washington, 1952. x+257 pp., 64 figs., 66 pls. $1.25.

This publication is the third of a series of meticulous archaeological studies on the southern Gulf Plain of Mesoamerica by Drucker. His work represents a standard rarely achieved in Mesoamerica and this new study is no exception. Drucker's definition of the Olmec art style is the best that the reviewer has seen. It is much sharper and clearer than any previous one and provides the reader with a useful tool for testing the geographical and chronological distribution of Olmec art.

Ceramic description and analysis form the nucleus of the book; the major problems are chronological, especially the placing of La Venta with relation to the previously established Olmec cultural sequence of Tres Zapotes. The excavations indicate clearly that La Venta falls entirely within a single period of the 3-period sequence of Tres Zapotes. Ceramic types, figurine styles, and stone sculptural style all indicate that La Venta equates with the Middle Tres Zapotes period which Drucker considers Early Classic. He suggests using "La Venta Period" for this phase of Olmec cultural history.

The most controversial part of the study is his review of the chronological relationship of the Middle Tres Zapotes period to other Mesoamerican regional sequences. He discusses relationships with Petén, Guatemala Highlands, south Pacific Coast of Guatemala, Yucatan, central Vera Cruz, Oaxaca, and central Mexican Highlands. One of the difficulties in establishing areal relationships is the fact that southern Vera Cruz-western Tabasco seems to have been bypassed by the major Mesoamerican trade routes and to have been culturally isolated throughout the Early Classic. Trade pottery is rarely found. The culture seems to have developed locally and in isolation. For example Teotihuacan 3 influence which spread so widely throughout Mesoamerica, seems to have missed this area completely. Drucker suggests that the Olmec kept and further developed a basically Preclassic culture into the Classic period, whereas in other Mesoamerican regions this culture type was absorbed and lost in the great fluorescence of regional Classic cultures.

His assignment of Middle Tres Zapotes as Early Classic is based on the criteria set forth in his Tres Zapotes report. Early Tres Zapotes shows generalized ceramic

relationship to Mamon-Chicanel; Upper Tres Zapotes has highly specific relationships to Teotihuacan 4. He argues, therefore, that Middle Tres Zapotes must be Early Classic. Wauchope, on the other hand, dates at least part of this period as Preclassic on typological grounds, a dating which involves dangerous assumptions. The reviewer discovered a site in the upper Tonalá drainage with typical Middle Tres Zapotes pottery and classic baby-face figurines in association with Late Classic Maya figurines of the Jaina type. The Olmec art style and probably the ceramic types as well, evidently enjoyed a huge time span in at least part of the Olmec area.

Drucker finds that with the exception of the Mexican Highlands the often discussed extensive diffusion of the Olmec art style to other areas is of the generic type and, thus, very difficult to assess chronologically. He rejects outright many published examples of the style. Especially important is his rejection of pieces from Monte Alban and Highland Guatemala. He considers the concept of the Olmec as a Mesoamerican "Cultura Madre" unacceptable. Rather, he views the Olmec as one of many vigorous regional styles in Mesoamerica, one which had its roots in the Preclassic, reached fluorescence during the Early Classic, and was replaced by highland cultures in Late Classic and Postclassic times.

The relationship between Tlatilco and La Venta, is a most difficult problem for there are stylistic relationships of a very specific nature. Drucker feels that the style represented by the Tlatilco figurines is closest to Middle Tres Zapotes. The chronological position of Tlatilco in the Valley of Mexico is certainly Preclassic, but Middle Tres Zapotes is Early Classic. Drucker postulates 2 possibilities: (1) Since the Valley was culturally backward, Middle Tres Zapotes is in part Preclassic — an argument which can be worked both ways; (2) Olmec plastic style actually fluoresced in the Early Tres Zapotes period which is still incompletely defined. In support of the first possibility he emphasizes the marginal location of the Valley. This is hardly a tenable position. Moreover, this solution to the problem of Olmec-Tlatilco relationships means rejection of Teotihuacan 3 as a chronological marker. A third possibility is that the style developed in an area of tropical fauna in Morelos and southern Puebla and diffused to the Valley and southern Vera Cruz where it reached secondary climaxes. In the homeland and in the Valley it was early replaced by Regional Classic cultures, whereas in the coastal area it persisted into the Classic.

One of the interesting by-products of Drucker's ceramic testing is the data on settlement pattern. He points out that the long time range and the uneven, sparse distribution of sherds indicate that La Venta was not a town but a ceremonial center with a small resident population. The reviewer found a similar pattern in the Middle Grijalva basin and on the East Coast of Yucatan. Data are rapidly accumulating to suggest that in the Lowland areas of Mesoamerica true urban centers and nucleated settlements were rare.

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Current Reports, Numbers 1-24. Edited by H. E. D. Pollock. Carnegie Institution of Washington, Department of Archaeology, Cambridge, 1952-55. Issued in parts. Illus.

This series, under the editorship of H. E. D. Pollock, is devoted essentially to the Carnegie Institution's recent work at the late Postclassic site of Mayapan in Yucatan. Designed to disseminate the data and results of each season's work as rapidly as possible, its tone is preliminary, factual, illustrative, and specialized. Each paper, offset printed and issued separately, represents the results of a single project. Jones's highly detailed map (Report No. 1) of the walled city is essential to an understanding of the pattern of excavations so far undertaken. The titles of these reports plainly illustrate the Institution's interests. Much time has been spent on distinguishing between lay and ceremonial structures and on archaeological analyses of their variations and functions. Inasmuch as the site consists of over 4000 buildings and platforms, this has been an enormous undertaking. House mounds and property boundary walls have been studied with great care because of their crucial role in urban analysis. Interest has also centered on Tabasco, the apparent source of an important pottery found at Mayapan. Many sites in Quintana Roo have been visited and excavated in an attempt to clarify the late period of Yucatecan prehistory on as broad a scale as possible. Further work at Chichen Itzá and various Puuc sites has been oriented to sequential and cultural problems encountered at Mayapan.

To date 24 reports have been issued: 1, *Map of the Ruins of Mayapan, Yucatan, Mexico* by Morris R. Jones; 2, *The Great Wall of Mayapan* by Edwin M. Shook; 3, *Residential Property Walls at Mayapan* by William R. Bullard, Jr.; 4, *Excavations in House Mounds at Mayapan* by Karl Ruppert and A. L. Smith; 5, *Cenote X-Coton at Mayapan* by Robert E. Smith; 6, *Chacchob, Yucatan* by H. E. D. Pollock and Gustav Strömsvik; 7, *Archaeological Reconnaissance in Tabasco* by Heinrich Berlin; 8, *A Portal Vault and Temple at Mayapan* by Strömsvik; 9, *Some Small Ceremonial Structures of Mayapan* by Robert M. Adams, Jr.; 10, *Excavations in House Mounds at Mayapan: II* by A. L. Smith and Ruppert; 11, *The X-Coton Temples at Mayapan* by Shook; 12, *Cenote Exploration at Mayapan and Telchaquillo* by R. E. Smith; 13, *Boundary Walls and House Lots at Mayapan* by Bullard; 14, *Three Temples and their Associated Structures at Mayapan* by Shook; 15, *The Northern Terminus of the Principal Sacbe at Mayapan* by Pollock; 16, *A Round Temple at Mayapan, Yucatan* by Shook; 17, *Excavations in House Mounds at Mayapan: III* by Ruppert and A. L. Smith; 18, *Explora-*

tion on the Outskirts of Mayapan by R. E. Smith; 19, *A Presumed Residence of Nobility at Mayapan* by J. Eric S. Thompson; 20, *The Temple of Kukulkan at Mayapan* by Shook; 21, *Excavations in Three Ceremonial Structures at Mayapan* by Philip E. Smith; 22, *Colonnaded Buildings at Mayapan* by Shook and William N. Irving; 23, *Exploration in Quintana Roo* by Strömsvik, Pollock, and Berlin; 24, *An Archaeological Reconnaissance of Northern Quintana Roo* by William T. Sanders.

The Mayapan program, because of the problems and procedures involved, surely merits interest beyond the natural concern of Mesoamericanists. The rawness and seeming discreteness, however, of these various papers may deter general interest. In this regard, one should note that the Department's *Annual Reports* contain a great deal of background, synthesis, and conclusion on the site and its excavation; these particularly are to be found in the reports of Pollock, the program's director. Summaries follow by staff members of work individually undertaken during the previous season and these directly relate to the *Current Reports*. Mention should also be made of the Department's *Notes on Middle American Archaeology and Ethnology*, an older series edited by J. Eric S. Thompson, in which papers are issued in the same format as the *Current Reports* on a variety of subjects pertaining to the Maya and other Mesoamerican people.

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Los Andaki 1538-1947: Historia de la Aculturación de una Tribu Selvática. JUAN FRIEDE. Fondo de Cultura Económica, Mexico, 1953. 304 pp., 4 maps. $2.10.

Estudios de Etnología Antigua de Venezuela. MIGUEL ACOSTA SAIGNES. Instituto de Antropología y Geografía, Antropología No. 1, Facultad de Humanidades y Educación, Universi Central de Venezuela, Caracas, 1954. x+302 pp., 9 figs. Bs. 12.

While these studies are ethnohistorical, both include references to archaeological matters. The Friede volume is concerned with one tribe, the Andaki, who moved from the Montaña or eastern slope of the Andes into the headwaters of the Magdalena River after the arrival of the Spaniards. As Friede points out (pp. 115-19), this latter region is well known archaeologically for the San Agustín culture, but there is no apparent connection between San Agustín and the Andaki. Rather, we must look to the as yet unknown archaeology of the Montaña for the antecedents of that tribe.

Acosta Saignes presents a series of essays, some on the early history of individual tribes, for example, the Mako and the Guaiquerí, and others on the origin and distribution of aspects of culture, such as slavery and cannibalism. Like Friede, he sets a high standard of scholarship and interpretation of sources. He is able to correct a number of errors in the Venezuelan section of the *Handbook of South American Indians* and to add significantly to the information presented there. His identification of "Mesoamerican traits on the Orinoco" is noteworthy, in that several of these traits are closely tied to the ball game on the Orinoco but do not occur with the ball game in the Antilles — yet they ought to be there if Stern is correct in deriving the Antillean ball game from the Orinocan game. Acosta Saignes (p. 150) relates these traits to the recent discovery of a "Mixtec" petroglyph in British Guiana.

Acosta Saignes makes another reference to archaeology in presenting an hypothesis of "ethnological stratigraphy," in which he outlines 4 successive waves of migration into Venezuela: (1) hunters and fishers, now extinct; (2) collectors living primarily off the *moriche* palm, for example, the present Warrau; (3) Arawakan-speaking and (perhaps) Chibchan-speaking tribes; and (4) the Cariban-speaking Indians (pp. 110-11). He calls upon archaeologists to test this hypothesis.

While archaeology may eventually be able to do this, I am afraid it is too much to expect from us in the near future. Economic practices and especially languages are always difficult to correlate with archaeological remains, and particularly so in the Caribbean area, where the tribes were unusually mobile and evanescent. For the time being, the more fruitful approach would seem to be to carry out correlated archaeological, ethnological, and historical research on individual tribes, in regions where conditions are most favorable, as Reichel-Dolmatoff has recently done so successfully for the Tairona of northeastern Colombia (1954, *Investigaciones arqueológicas en la Sierra Nevada de Santa Marta*, Rev. Colombiana de Antropología, Vol. 2, pp. 147-206, and Vol. 3, pp. 139-70, Bogotá). In Venezuela, Acosta Saignes' own study of the contact-period Guaiquerí (pp. 221-42 of the book under review), McCorkle's work on the more recent history of that tribe (1952, *The History of the Guayqueri*, Kroeber Anth. Soc. Papers, No. 6, pp. 60-87), and Cruxent's and Goggin's unpublished research on the archaeology of Cubagua and Margarita islands, where the Guaiquerí once lived, all promise to result in a detailed synthesis of the prehistory and history of that tribe. Only after a number of such syntheses have been made will we be in a position to test Acosta Saignes' hypothesis of "ethnological stratigraphy."

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Ancient Arts of the Andes. WENDELL C. BENNETT. Introduction by Rene d'Harnoncourt. The Museum of Modern Art, New York, 1954. 188 pp., frontis. 208 figs. (6 in color), 4 maps. $6.50.

32 Masterworks of Andean Art. A supplement to Ancient Arts of the Andes. Preface by Rene d'Harnoncourt. The Museum of Modern Art, New York, 1955. 32 pls. $1.00.

For a decade the Director of the Museum of Modern Art, Rene d'Harnoncourt, selected specimens from the museums and private collections of the world for a special exhibition entitled "Ancient Arts of the Andes."

The culmination of this effort was a most spectacular show of over 400 archaeological specimens, many of them exhibited for the first time in the United States. Timed to appear simultaneously with the exhibition was the publication of *Ancient Arts of the Andes* which "deals with the arts of the pre-Columbian civilizations of the Andes and with related arts from the adjacent Amazon region and southern Central America." The book contains 208 plates illustrating fine examples of metal, wood, shell, bone, stone, pottery, and textile objects which give the reader a sweeping presentation of the artistic achievements of these aboriginal peoples.

Since professionals not specialized in this area may use the book uncritically, it seems pertinent to mention a few historical facts regarding the preparation of the text. Only a first draft of the manuscript had been presented to the Museum of Modern Art before Bennett's sudden death in the summer of 1953. The Museum staff, especially Mildred Constantine, was then given the tremendous task of preparing the book for a publisher's deadline. None of the captions were written by Bennett (which explains some of the glaring errors); nor did he have the usual author's privilege for changes in choice of wording as the volume went to press (which should be remembered when checking Bennett's last ideas on Andean archaeology).

The text is organized as follows: The Andes; The Central Andes; Central Andean Cultures by 6 periods from 1200 B.C. to Spanish Conquest in A.D. 1532; Technics of the Central Andes; The South, Chile and Argentina; The North, Ecuador, Colombia, Venezuela, Panama and Costa Rica; The East, Amazon and Orinoco Drainages. Some Peruvianists will object to Bennett's generalized, all-inclusive period designations, but the reviewers feel that this scheme is in enough conformity with the detailed cultural periods of the specialist to cause no confusion even if it does leave out or gloss over some of the problems of time and spatial distributions still bothering Andean archaeologists.

This volume creates (as did the exhibition) the erroneous impression that artistic expression in the Andean area started around 1200 B.C. Though few examples are known, there is evidence of a traditional art style at least 8 centuries earlier. To avoid the perpetuation of misstatements in the text a few, (especially those on pp. 26 and 172) are noted. "Chipped stone tools" and "stone boiling" are not part of the Huaca Prieta complex; "manioc" was not introduced with maize during the next period; "salt peter" has no bearing on preservation. "Marajó" is misspelled as "Marajão" 10 times from page 171 on, as well as on the end maps. Marajó urns are said to be effigy with "crude representations of human figures," but the term should be "stylized representations." One of the most outstanding Marajoara pottery technics, excision (also called champlevé), is omitted from the list. Although the vessel in Figure 204 is said to be "covered with finely engraved decoration," it is an excellent example of excision. There is no evidence for the conclusion that the curved triangular pottery fig leaves called "tangas" from Marajó are "worn by the women for protection in the water."

In the discussion of "The North" the wrong emphasis is given by the statement (p. 127): "The wet forest coverage on the highland slopes is not suitable for grazing the llamas and alpacas. As a consequence, the weavers had only cotton for fibers, and the textile art was not too advanced." Absence of wool does not restrict textile art; lack of preservation in Ecuador, Colombia, Venezuela and even the highlands of Peru and Bolivia have given us but a few textile objects from these regions. Differential preservation is an important point in Andean areas and the absence of perishable materials should never be used as absolute proof that any group did not develop that particular craft as well as crafts in durable pottery, metal, or stone. This mistaken reasoning occurs in several places throughout the text. Although Bennett was never noted as an expert technologist, the section on ceramic technology (pp. 111-2) is so misleading and unclear that it would have been better to have omitted it entirely.

The supplement, *32 Masterpieces of Andean Art*, was published a year later. It is a weclome addition because important specimens from the Rafael Larco Hoyle and Norbert Mayrock collections arrived too late to be included in the larger volume. Moreover, the photographs available for the main volume did not do justice to certain specimens which were rephotographed for the supplement.

All specialists in Andean archaeology should have both these books for the presentation of heretofore unillustrated materials. Those working in museums where the public constantly wants to see popularized "picture books" of aboriginal art will find them invaluable; the nonspecialist should be inspired to delve further into the subject; and the artist should receive a good cross-sectional understanding of the artistic accomplishments of the pre-Columbian cultures of the Andean and adjoining regions.

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NOTES AND NEWS

EDITED BY CLEMENT W. MEIGHAN

GENERAL

The Third Great Basin Archaeological Conference will be held at the newly completed men's dormitory Baliff Hall, on the University of Utah campus on August 20 and 21, just after the Pecos Conference at Flagstaff. Food, lodging, and meeting place, at very reasonable rates, have been arranged. The meetings are being arranged by Jesse D. Jennings (program chairman), assisted by L. S. Cressman and E. B. Sayles, J. H. Gunnerson (local arrangements), and Clement W. Meighan (corresponding secretary). The program, still tentative at press time, includes short field reports, a session on the status, reliability, and usefulness of radiocarbon dating (J. B. Griffin, chairman), an address by Faye-Cooper Cole, who will also be general conference chairman, a session on Great Basin ethnology (Omer Stewart, chairman), and archaeological papers by E. B. Sayles, J. H. Gunnerson, William Roosa, Ruth Simpson, and others.

The Twenty-ninth Pecos Conference will be held at Flagstaff, Arizona, on August 16, 17, and 18, 1956. Headquarters will be at the Museum of Northern Arizona. As in the past, the time will be divided between brief reports on field work and discussions of important problems of current interest in Southwestern archaeology and ethnology.

LOWLAND SOUTH AMERICA

The lag in publication and the inaccessibility of reports keeps advances in archaeological knowledge in many parts of Latin America from coming to the attention of North American archaeologists. Consequently, the assistant editor in charge of this section has thought it advisable to provide summaries of recent work on an annual basis. The collaboration of Alberto Rex Gonzalez of the Museo de la Plata makes it possible to present here brief summaries of several recently defined cultures and stratigraphic sequences in Argentina. These do not make it necessary to alter our views of this part of South America, but they provide data that significantly expands our knowledge of the prehistoric situation.

The investigations by Menghin in southern Patagonia have produced a sequence of preceramic cultures that supplements and partly correlates with that of Bird from the Straits of Magellan. The earliest complex, called Oliviense, consists of flakes and very crude and long scrapers, all of which show only marginal chipping. This complex is poorly defined as yet and its dating is uncertain, although Menghin believes it to be associated with marine terraces of the last or next to the last interstadial. On a lower terrace, dated from the final period of the last glaciation, another and presumably more recent complex known as Solanense was found. This consists of bifacially flaked, rounded-base points, crude triangular scrapers, unretouched flakes, hammerstones, and cores. A third culture, named Toldense, is identified in several caves in the interior of Patagonia and corresponds to Bird's Period 1 from the Straits of Magellan. Bird's sequence continues the chronology up into historic times.

In central Argentina (provinces of Córdoba and San Luis,) Gonzalez and Menghin have excavated several sites with preceramic horizons. A complex designated as Ayampitin has been identified not only here but also in northwest Argentina and in Bolivia. Its diagnostic feature is a rather thick quartz projectile point of lanceolate form, 4 to 10 cm. long. Associated are scrapers, manos and metates, bone tools, and coloring materials. The antiquity of this complex in Córdoba and San Luis is estimated at about 5000 years, although it is believed to have persisted into more recent times in some parts of the area over which it is distributed. At Intahuasi, the Ayampitin complex is found stratigraphically beneath another preceramic culture, called Ongamira after the type site. This later complex includes flakers, perforators and needles of bone, shell ornaments, large lumps of red and yellow mineral paint, and stone knives, scrapers, atlatl hooks, metates, manos, and triangular projectile points. At Ongamira this complex is followed by one containing many of the preceramic traits but with the addition of pottery, bola stones, and other new features. It is estimated to date from the first part of the Christian Era.

In northwestern Argentina, the area with the most advanced indigenous cultures, survey and excavations undertaken by Gonzalez from 1951 to 1955 have outlined a general sequence from preceramic to Spanish times. Although there are some other local preceramic complexes, the Ayampitin culture is apparently widespread in this region as well as in central Argentina. Following it in the Valle de Haultin are 4 major ceramic periods. The earliest, La Aguada, begins in an advanced state, with polychrome pottery of several kinds and metal axes, both plain and ceremonial. (This period was formerly included in Barreales culture.) Cienaga, which follows, appears to have evolved from La Aguada. It is characterized by red-on-buff and black-on-white pottery with geometric motifs, axes similar to those of the preceding period, bells and ornaments of gold, and a stone industry including large flakes worked on one surface, an odd type of bola, and cylindrical stone vessels. It is not certain whether the Condorhuasi culture follows Ciénega or is contemporary with it. Although painted pottery is common, the most typical feature of Condorhuasi ceramics is the rich plastic art expressed in human and animal effigies. Among the other traits of this culture are copper bracelets, sheets of gold, turquoise beads, and grooved stone axes. Lip plugs are characteristic objects of personal adornment. The final pre-Spanish period, Belén, can be divided into 3 parts

on the basis of architectural differences. In Belén I pit houses are typical, associated with black-on-red pottery. Belén II represents the introduction of surface structures of stone in more or less isolated units of a few rooms each. In Belén III true pueblos with up to 300 rooms appear, as well as forts and irrigation works. This sequence in the Valle del Haultin is supplemented by one from the Valle Calchaquí showing a parallel development differing in specific details.

The above descriptions, although brief, raise interesting possibilities for future research. Two may be mentioned. What are the chronological and cultural relationships of the preceramic cultures in southern South America to those in North America? Some of the artifact types are similar, others are different. And what significance is there in the parallelism of the pit house to surface room to pueblo sequence in northwestern Argentina and the southwestern United States? It is fortunate that Argentina has qualified archaeologists who will be in a position to help answer these and other questions in the years to come.

Assembled by BETTY J. MEGGERS

MIDDLE AMERICA

MEXICAN PLATEAU. Serious efforts are being made to clear up problems of stratigraphy and chronology in this area. During the months of July and August, 1955, George W. Brainerd of U.C.L.A. conducted his second season of excavations at the site of Cerro Portesuelo in the Valley of Mexico. This work was directed toward an understanding of the time period between the Classic Teotihuacan and Toltec occupations of the area. The site, surveyed by 65 stratigraphic trenches in 1954, was excavated at 2 locations last summer. A 20 m. by 25 m. area produced several successive levels of domestic architecture, with an occupation dating in the main from the Toltec period; a second excavation produced a succession of large building substructures pierced by intrusive burials at various points. The use of this area began in Teotihuacan times and continued later. A detailed ceramic chronology is resulting from the first season's work, and the new data are extensive enough to promise considerable information. Five students assisted in the excavations, which were financed by the Wenner-Gren Foundation.

On November 16, 1955, during the meetings of the American Anthropological Association, Brainerd called together interested archaeologists to discuss problems of chronology involved in the later periods of occupation in the Valley of Mexico. To everyone's regret, Mexican scholars invited were unable to attend. New information was presented by William J. Mayer-Oakes on his 1954 excavations at El Risco, and by Paul Tolstoy, who has recently applied Ford's method of seriation of surface collections to over 100 sites in the Valley. Part of the afternoon session was devoted to viewing photographs of ceramics excavated by Brainerd, among which were a number showing whole vessels of Coyotlatelco ware, until now known only through sherd collections. The association of these vessels with vessels attributed to Teotihuacan times was of particular interest.

Directed to similar problems is the recent work of Florencia Muller and César Lizardi Ramos at Tulancingo, where they have uncovered deposits including a period lasting from Ticoman times to Aztec IV.

NORTHERN MEXICO. The Schroeder site in Durango, where excavation by the Museum of Southern Illinois University under the direction of J. Charles Kelley will continue this summer for 2 months, forms an important link between the cultures of Mexico and those of the Southwest. Material recovered in 1954 indicates at least 2 distinct phases of occupation. The Ayala phase, with simple block masonry, small house platforms, and courts grouped around a plaza, is linked with the Colonial period of the Hohokam Culture and contains intrusive Chametla pottery from the west coast of Mexico. The Rio Tunul phase shows ties with the Aztatlan culture on the west coast and with the Sedentary phase of the Hohokam. This summer a ceremonial group and a house group are to be excavated, as well as a structure that appears on the surface to be a ball court. Stratigraphic tests in various parts of the site are planned. The excavations are part of an anthropological field project which will include in addition to the director, 5 to 10 staff members and about 20 students.

GULF COAST. We have no recent reports from this area, but we wish to amend our notes in the October, 1955, issue on Philip Drucker's dig at La Venta by adding that The National Geographic Society, the Smithsonian Institution, and the University of California, Berkeley, cooperated in sponsoring the project. Robert Heizer acted as co-director with Drucker, and Contreras and Squier were Assistant Archaeologists. The principal aim of the digging was the observation of architectural features and structural sequences at the site. This aim was fully realized and incidentally a number of elaborate offerings were uncovered.

CHIAPAS. A new project of major dimensions was started last season in Chiapas by the New World Archaeological Foundation. It is concerned primarily with a study of early sites in the valley of the Grijalva River between Chiapa de Corzo and the Guatemala border. The region was selected after an extended survey made by T. S. Ferguson, J. L. Sorensen, and others, in consultation with E. M. Shook. A number of promising sites are already located. Heinrich Berlin and G. W. Lowe are directing the field work, with 5 archaeologists assisting. In November, 1955, they began excavations at Chiapa de Corzo, intending to proceed to Acala and other key sites suggested by the survey, which will continue concurrently with intensive digging.

MAYA AREA. For many years archaeologists have talked of major excavations at Tikal, but for the first time a substantial step in this direction was taken when the University of Pennsylvania Museum, with the cooperation of the government of Guatemala, inaugurated a long-term project under the direction of John Dimick. The plans are conceived on a grand scale and include

not only an archaeological study of Tikal, to continue over a number of years, but also partial restoration of selected buildings with a view to opening the site for visitors and scholars. It is hoped that the project will serve as a center for the study of the Maya civilization and for the training of students in this field. Chief archaeologist is Linton Satterthwaite, Jr. Work was scheduled to start January 15, 1956, when Edwin M. Shook, as Field Director, was to begin the task of setting up permanent living and working facilities at the site and to do preliminary clearing and exploration in order to select locations for major excavations that are to begin next year. If this project comes to full fruition, which is the hope of all Mayanists, it will be the largest yet attempted, and will put our knowledge of the Maya civilization on a par with that of the early centers of the Old World.

At Palenque, where the Instituto Nacional, aided by grants from Nelson Rockefeller and Howard Leichner, is carrying on excavations under the direction of Alberto Ruz Lhuillier, the 1955 season began in June, 1955, and though it produced no such sensational finds as in former years, important new material was uncovered. In the north group, 2 temples of typical Palenque plan, one smaller single room structure, and a tomb were partially excavated. Three sealed tombs were found in the Temple del Conde, one of which produced an interesting item, plaster impressions of a textile apparently used to cover the tomb. Temple X, newly cleared, revealed somewhat weathered sculptured figures set in its substructure on each side of the stairway. Restoration was resumed on the Palace, the Temple of the Inscriptions, the Temples of the Cross and the Foliated Cross, and Temple XXI. Hippolito Sanchez made detailed drawings of 600 of the 620 hieroglyphs that form the text in the Temple of the Inscriptions. The building of a small museum has been started at the site to house the collections and to provide for their exhibition.

The current project of the Peabody Museum of Harvard University, devoted to the study of a "total community" of the ancient Maya in British Honduras, is in its 4th and final field season, directed by Gordon R. Willey, with William Bullard and John Ladd assisting. Field work was scheduled to begin February 1, 1956, and is to consist primarily of mapping river sites between Benque Viejo and Banana Bank and of testing the occupation of these sites by stratigraphic pits in house mound locations.

The Carnegie Institution of Washington has finished its field work at Mayapan, which last season was devoted largely to house locations and to the small ceremonial center of Itzmal Chen. Most of the Current Reports have been issued or are in press, as well as survey reports by Heinrich Berlin on the Tabasco area and by William Sanders on the east coast of Yucatan. Study of notes and collections, however, continues and is focused on ceramics, artifacts, and architecture. For those interested in urbanism and settlement patterns, the work of Ruppert and Smith on house mounds, which covers a complete survey of such structures at Mayapan and includes comparative material from other sites, should be of particular interest. The Physical Laboratory at Groningen, Holland, has announced 2 radiocarbon dates representing the earliest and latest strata associated with constructions at Mayapan. The dates, which accord well with archaeological and historical estimates, will be released shortly.

Gordon Ekholm, accompanied by Paul Tolstoy and his wife, Christie, left New York February 1, 1956, for a 4-month field season at Comalcalco in Tabasco, Mexico, for the American Museum of Natural History. They will completely map the site, survey the extended area of the site by many test excavations, and do some work in buildings. Comalcalco is the westernmost of all large Maya sites and has the unique feature of being built entirely of fired brick. It is also in a strategic position for showing contacts with culture centers in Mexico proper.

Frans Blom reports that in 1954, exploring a region of central Chiapas, where amber is abundant, he found three amber nose buttons in a rock shelter. He also observed an extensive group of ruins at Bolonchan, near Sitala, and made another trip into the area in January, 1956.

Early in 1954, Henri Lehmann excavated at Chicol, a religious center of the Mam Indians, 15 km. west of Zaculeu in the highland region of Guatemala. In 1955 he excavated and partly restored structures at Mixco Viejo, Department of Chimaltenango, Guatemala.

Assembled by TATIANA PROSKOURIAKOFF

SOUTHWEST

ARIZONA. Under arrangements made with Jesse L. Nusbaum of the National Park Service, Emil W. Haury and E. B. Sayles of the Arizona State Museum supervised archaeological salvage work in the construction of the Southern Pacific Company's oil products pipeline across southern Arizona. The Southern Pacific Company is the nation's first railroad to sponsor a pipeline transportation enterprise. Arrangements for archaeological survey and recovery in the right of way were made between Nusbaum and Paul L. Shobe, Superintendent of Lands for Engineering Management, Inc., the company which handled the engineering design and construction of the line. Most of the pipeline location was within the Southern Pacific Company's right of way where evidence of sites had been largely obliterated in railroad grading prior to 1883 and in subsequent maintenance operations. Areas extending from the eastern Arizona border to the Hassayampa River west of Phoenix were surveyed by John T. McConville and Frank M. Holzkamper, graduate students, Department of Anthropology, University of Arizona. Right of way inspection and open trench checking over 275 miles produced 46 sites. Stratigraphic tests were made in 4 of these. Trench inspection revealed a number of hearths, an earth oven, and a Sacaton phase pit house. David Breternitz and Robert Komerska, also graduate students

of the University of Arizona, were assigned the western portion in Arizona extending from the Hassayampa River to Yuma, a distance of 119 miles. Five sites, one of which produced manos and chopping tools and no pottery, were reported. With this exception all remains checked in both surveys are of either early historic or later prehistoric origin.

The Southern Pacific Company's archaeological cooperation also includes the inspection of military laterals to 3 United States Army Air Force bases in Arizona scheduled for January, 1956, embracing the right of way on all lands regardless of federal, railroad, state, or other ownership. McConville and Holzkamper have been given this assignment.

In September, 1955, William N. Wasley was appointed to the staff of the Arizona State Museum as Archaeologist. Wasley is working closely with state and federal agencies and the citizens of the state in developing adequate archaeological salvage measures connected with land reclamation, highway construction, and other earth-moving operations.

The Amerind Foundation, Inc. will soon issue its seventh volume, pertaining to the San Cayentano del Tumacacori excavations. The staff is currently busy rearranging its archaeological exhibits and organizing its new storage facilities. Frances Sessions has joined the staff as secretary-librarian. Future plans are to conduct a survey in the Gila-Salt area as a preliminary study to the next series of excavations which will be concerned primarily with gaining knowledge pertaining to the "Great House Builders" who built such establishments as Casa Grande.

The Museum of Northern Arizona has a new staff member, Barton Wright, who was formerly connected with the Amerind Foundation. Three programs were carried out by the Museum during the 1955 season. Archaeological work was continued at the Pollock Site (N.A. 4317). John C. Mc.Gregor was in charge of the University of Illinois crew on the joint project with the Museum of Northern Arizona. Six more rooms of the pueblo were dug and a number of additional rooms outlined. To date a total of 30 rooms have been studied. Additional burials were excavated in the trash and a room up the slope from the pueblo was dug. This room was earlier than the Pollock Site pueblo which may date between 1250 and 1325.

R. C. Euler, Arizona State College, cooperated with William C. Miller on an archaeological survey of a section of Navajo Canyon, Arizona.

Douglas W. Schwartz of the University of Oklahoma, Norman, tested some caves in the Grand Canyon area during August. This was a joint project of the Yale Peabody Museum, supported by the Wenner-Gren Foundation for Anthropological Research, the Western Speleological Institute, with the cooperation of Grand Canyon Inn, Grand Canyon, and the Museum of Northern Arizona, Flagstaff. The objective of the project was to determine, if possible, the cultural and chronological position of certain archaeological material, in particular, small twisted-twig animal figurines found in large numbers in some of the caves. The tests resulted in no associations which would resolve the problem. It is hoped that material from future work will give a clue to the cultural association. The chronological placement of the figurines may eventually be accomplished by radiocarbon dating.

The Southwestern National Monuments Division of the National Park Service reports the following activities: Zorro Bradley and George Cattanach completed a salvage excavation on 2 sites within the road right of way at Wupatki National Monument. Both included slab-lined pits with a few courses of dry masonry also evident, and roughly rectangular, one-room, semisubterranean structures, one of which revealed a fireplace and a few postholes. Both sites were practically devoid of cultural material, but appear to have been occupied after the eruption of Sunset Crater.

The Southwestern National Monuments Division has inaugurated a project of drawing up archaeological trait lists on areas under their jurisdiction. The need for such information has been felt for a long time and the results of the project are expected to contribute considerably to the interpretive program, particularly in the preparation of exhibits and in research projects requiring comparative trait data. Fred Peck has completed the first of the trait lists at Tuzigoot.

Sallie Van Valkenburgh began an archaeological survey of the north rim of Walnut Canyon National Monument in the fall, a project scheduled to be completed next summer.

Fred Peck has completed a survey of the East Verde River drainage from its headwaters to its junction with the Verde River in central Arizona, in an effort to determine the prehistoric cultural relationships of the sites on this stream with those of the Tonto Basin, Little Colorado River Valley, and the middle Verde Valley.

NEW MEXICO. Richard B. Woodbury, Columbia University, and Nathalie F. S. Woodbury, Barnard College, continued their field work under a Department of the Interior permit at El Morro National Monument from June 23 to September 6. Excavation was limited to completing the clearing of a large circular kiva in the Atsinna site, which had been started in 1954, and putting down a test in another large ruin across the box canyon to the north, the results of which indicate it was contemporaneous with Atsinna. Most of the season was devoted to analyzing the material recovered from both the 1954 and 1955 excavations. Atsinna shows a surprising elaboration of architectural details in domestic rooms, the presence of both a round and a square kiva, an occupation from sometime in the 12th century into the 14th century, and ceramic evidence of intimate connections with prehistoric Zuni sites.

Gordon Vivian, Roland Richert, and Dale King made, in the fall of 1955, a brief reconnaissance in the Gila Cliff Dwelling National Monument area and report a variety of sites representing different periods of occupation in the vicinity.

Fred Wendorf, of the Museum of New Mexico, has been continuing "Highway Salvage Archaeology" under the program set up between the Museum of New Mexico and the New Mexico State Highway Department. Three miles north of La Plants, New Mexico, Wendorf, Charlie Steen, and Stewart Peckham excavated a 7 room Mesa Verde (Montezuma phase) pueblo and associated kiva. The distinguishing feature of the kiva was the alternating layers of red, white, and black paint on the walls, though only in solid panels with no designs. Immediately adjacent to the Mesa Verde site was a burned Basketmaker III pit house having a double antechamber. Fifteen miles south of Dulce, New Mexico, on the Jicarilla Apache Reservation, Stewart Peckham excavated a burned Rosa phase pit house site. Two of the pit houses were round, had southward oriented ventilators, and roof posts partly incorporated into the walls. One of these rooms possessed a broad bench. A third pithouse was small, roughly rectangular, shallow, and oriented toward the east. Pottery corresponded generally with that described by Hall for the Gobernador area to the west. No surface rooms or stockades were found.

The Texas Technological College had 2 crews in southeastern New Mexico from July 15 to August 24, 1955. One group undertook a cooperative dig with the University of Nebraska in Hermit's Cave in the Guadalupe Range west of Carlsbad, New Mexico. A joint report will be issued by the University of Nebraska on this work. The second group sampled several sites in the foothills of the Capitan Mountains. Extensive work was done on the Turner Ranch 9 miles east of White Oaks, New Mexico, under W. C. Holden.

At the Chicago Natural History Museum, John Rinaldo has been analyzing the results of last summer's excavations in the Mogollon area of western New Mexico and eastern Arizona. A number of dwelling rooms, a roofed-over plaza, and parts of a refuse dump were excavated in a large transitional (Tularosa phase to Pinedale phase) ruin located south of Blue Post Office on the Blue River.

During the last few months Elaine Bluhm has been working on horizon styles for pottery designs for the Southwest. She has found that the same or similar distinctive design elements were in use throughout the Southwest at more or less the same times.

Colorado. Marie Wormington, of the Denver Museum of Natural History, says that her joint publication with Robert H. Lister, of the University of Colorado, entitled "Archaeological Investigations on the Uncompahgre Plateau in West Central Colorado," is in press and should be out shortly after the first of the year. It will be Number 2 in the Museum's *Proceedings*.

The University of Colorado, Department of Social Science, has granted a leave to Robert H. Lister, who is continuing to test cave sites in the Sierra Madre country of Chihuahua and Durango, tracing Southwestern culture southward.

Assembled by Edward B. Danson

PACIFIC COAST and GREAT BASIN

Due to lack of funds, the archaeological survey and salvage program of the National Park Service in Region Four has been virtually suspended, as far as field work is concerned. Contracts made during the 1954 fiscal year continue in effect for surveys in Death Valley National Monument (University of Southern California) and for excavations in The Dalles Reservoir area (University of Oregon and University of Washington). The University of Washington has completed a site survey of the Olympic Ocean Strip, Olympic National Park, and a report is now near completion. Aside from field work, the past 6 months has been a period of real accomplishment in the National Park Service's program to protect archaeological values. Upon the recommendation of the Service, the Federal Power Commission has given effective recognition to the principle that utility companies and utility districts have a responsibility for salvaging archaeological material threatened by their water control projects. One of the provisions of a license offered to the Idaho Power Company for the construction of the Hells Canyon Project on the Snake River was that the company should furnish $12,000 to the Smithsonian Institution for archaeological salvage. In issuing a license to Public Utility District No. 2 of Grant County, Washington, for the Priest Rapids Project on the Columbia River, the Commission required that the licensee should make available to the Secretary of the Interior up to $40,000 for archaeological salvage excavations.

California. At the University of California, Berkeley, S. F. Cook and A. B. Elsasser have completed a survey of a series of sand mounds in the Sacramento-San Joaquin delta region, from which burials of a probable early Middle horizon affiliation, as determined by bone and shell artifact typologies, have been recovered. An unusual feature of these mounds is that the burials occur in indurated sand, not in association with occupation deposit. This is strongly reminiscent of Early horizon sites which occur not far to the north. Although Early horizon sites are not characterized by sand concentrations, the lower parts of Early deposits, like those of the sand mounds, seem to have undergone a progressive hardening which is expected ultimately to be attributable to and correlated with climatic changes of considerable magnitude in the region.

The analysis of material recovered from a large occupation deposit in Lassen County (Las-7) is being continued by F. A. Riddell. Indications of typological stratification are emerging from the study, though because of disturbance of the deposit by rodents, total interpretation becomes extremely difficult. Probable atlatl hooks and scapula awls, as well as clay figurines, have been recovered, all suggesting an early period of occupation in the time range of the Middle horizon of central California. Since the site seems to have been part of a larger Great Basin culture, its associations with central California also make it important in filling out the picture of this aspect of the prehistory of the western United States.

R. J. Squier and G. L. Grosscup spent one week, in November, 1955, in the Tule Lake Region, Modoc and Siskiyou counties, engaging in site survey and recording private collections. Of particular interest was the observation of "boatstones" in several collections. These objects occur rather rarely in California, and their presence in the Tule Lake region in such relatively great numbers is expected to change established ideas about their distribution.

J. A. Bennyhoff has completed a report on 3 seasons of survey and test excavations in Yosemite National Park conducted between 1952 and 1954. Almost 400 sites have been recorded between 1600 and 10,700 feet elevation. About 44% of these sites, concentrated in the Transition life zone, represent bedrock mortar sites with from one to 473 mortar holes associated with each site. Five sites have simple pictographs. Test excavations in 4 sites have provided stratigraphic evidence for a succession of 3 cultural assemblages. The protohistoric phase has been termed the Mariposa complex. It is characterized by small projectile points weighing less than 1 gram (especially a side-notched form with concave base), bedrock mortars, cobble pestles, steatite vessels, and probably pictographs. The Tamarack complex is earlier, and is characterized by the bedrock mortar and cobble pestle, and projectile points weighing from 1 to 3.5 grams. The Crane Flat complex, the earliest cultural period yet defined, is characterized by the mano and metate, and heavy projectile points weighing more than 3.5 grams.

A. E. Treganza and A. B. Elsasser have completed the analysis of artifacts recovered from 2 sites, Nap-74 and Nap-93, in Berryessa Valley, under contract with the National Park Service. Excavation at these sites has provided material which should fairly represent the prehistoric culture of the area, which is expected to be flooded by the Monticello Dam Project in 1956 or 1957. Results of the analysis have confirmed what had been previously only suspected: that the Berryessa Valley sites were part of a widespread Napa region culture, which in turn exhibited numerous Central Valley traits of the Middle and Late horizons. No typical Early horizon sites have yet been positively identified in the Napa region.

G. L. Grosscup conducted a survey of the east shore of Washo Lake, Nevada, in November, 1955. Nine new sites were discovered, and exposures of probable buried midden deposit were noted in some of the dunelike sites. Further investigation is contemplated in this area, where, in addition, artifacts of the Martis culture have appeared in surface collections.

S. F. Cook and R. F. Heizer have reactivated the laboratory for chemical determination (including fluorine) of fossil bones with a grant from the Wenner-Gren Foundation. Further work in mound component analysis is being carried out in continuation of the problem begun in 1947.

At the University of Southern California, William Wallace reports that Alice Hunt has been named collaborator with the University's archaeological survey of Death Valley National Monument. At present, she is conducting a survey in the Furnace Creek area in cooperation with her husband, Charles B. Hunt of the United States Geological Survey, who is investigating Pleistocene and Recent geology of Death Valley.

A group, calling itself the Archaeological Research Associates, has been organized to carry on research in the southern California area. Membership is made up largely of students from the University of Southern California and Long Beach State College. They are at present surveying the coastal region from Redondo Beach to San Pedro. This is being done in cooperation with the Southern California Archaeological Survey Association. Roger J. Desautels of the University of Southern California was elected chairman of the new group.

UTAH. James H. Gunnerson, Curator of the Museum of Anthropology at the University of Utah, reports that the fourth number, which completes the first volume of *Utah Archeology*, was prepared for January distribution. *Utah Archeology* is a quarterly newsletter of the Utah Statewide Archeological Society, an informal organization sponsored by the Department of Anthropology, and primarily for nonprofessionals who are interested in Utah prehistory. Membership at present is over 100 and is still growing.

WASHINGTON. Douglas Osborne of the University of Washington reports that B. Robert Butler, graduate student, is continuing close cooperation with the Wasco County-The Dalles City Museum Commission and archaeological salvage activities in The Dalles Reservoir. Butler is receiving support from the University, the Museum Commission, and local interested citizens. He has thus been able to be on the ground to observe and salvage archaeological sites and material as construction work progresses. A $1000 grant has been given Osborne for work in The Dalles Reservoir this coming summer. Butler will supervise this work, which will be largely confined to Wakemap Mound and the immediate area.

James Garner of the Washington State Museum and the Department of Anthropology has completed a burial removal job for the Army Corps of Engineers and the Nespelem Indians near Nespelem, Washington. The tribe requested that these burials be removed as they were in some danger of flood or wave action from the waters of the Chief Joseph Reservoir. The work was supervised by Garner with a crew of Indians and expenses were borne by the Army Corps of Engineers. Garner has found that contrary to the Indians' general belief, most of the burials were either precontact or just into the postcontact period. He has recovered some archaeological information from the work and will publish on it later.

The archaeological research program of the past year at Western Washington College of Education, carried out by Herbert Taylor, included a survey of the east coast of Vancouver Island and the southern coast of Quadra Island. Students from the University of British Columbia and Western Washington College of Education assisted in the survey. Taylor is currently preparing

a report on the 70 sites located by the survey. A part of the funds for the survey, which was carried out under the general direction of Harry Hawthorne of the University of British Columbia, was provided by the Canadian Social Science Research Council. Taylor also conducted a survey of the northern coast of Washington, from Neah Bay to Cape Alva. He plans to continue the survey southward to Lapush during the coming summer.

BRITISH COLUMBIA. Charles Borden of the University of British Columbia continued working at Marpole until the third week of August. The excavators recovered about 4000 artifacts, exposed and removed 21 burials, and gathered important information on many aspects of the Marpole culture.

Borden reports that with charcoal collected in 1954 K. J. McCallum, of the University of Saskatchewan, made 2 radiocarbon tests. The material was obtained from the lowermost 10 inches of midden overlying the subsoil. The results are as follows: (a) 2015 ± 166; (b) 1880 ± 180; average 1950 ± 125. These results have an important bearing on the antiquity of the woodworking industry on the Coast. Among the most significant data collected were those on woodworking and house construction. The 3 essential tools still associated with recent large scale woodworking on the southern Northwest Coast, large wedges (of elk antler), pestle-shaped handmauls of stone, and small and large adze blades (of jadeite and nephrite), were found in the same levels from which the dated charcoal sample was obtained. There is thus a strong probability that Northwest Coast woodworking was well-advanced 2000 years ago. That this woodworking may have already included long plank houses of the historic Nootka-Coast Salish type is suggested by the portion of a large house found at the site. This portion included a rectangular area with postholes that must have contained massive house posts 21 feet east to west and about 30 feet north to south. There was unmistakable evidence that the broad hearth area running east to west through the center (probably the long axis) of the dwelling extended farther in both direction. Other commitments and lack of funds compelled termination of the work at Marpole in August.

Assembled by RICHARD D. DAUGHERTY

PLAINS

The 13th Plains Conference for Archaeology was held in Lincoln, Nebraska, November 24-26, under the Chairmanship of Donald J. Lehmer. Richard P. Wheeler was Program Chairman. There were 4 major sessions plus an evening talk and a business meeting. Fifty-three persons registered. John M. Corbett was chairman of the first session, which consisted of informal reports on the field work of the 1955 season. Most of this work is reported elsewhere in this section. The session was followed by a Thanksgiving dinner.

Preston Holder was chairman of the second session. Maxim K. Elias, a paleobotanist, gave a paper on "Vegetation of the Plains Before the Advent of Man," in which he rejected the thesis that the Plains area was wooded before the coming of man. This paper was followed by a panel discussion of the skeletal discoveries made at Turin, Iowa, in August and September, 1955. Panelists were Franklin Fenenga, Weldon D. Frankforter, Reynold J. Ruppé, H. M. Wormington, and E. Mott Davis. This was the first opportunity to review the circumstances of these discoveries before a professional group. (For details of the Turin finds see section on Early Man below.)

The third session, with Franklin Fenenga in the chair, was made up of formal papers. Two of these papers, by H. M. Wormington and David Gebhard, were field reports which are summarized elsewhere in this section. The other papers were: W. Raymond Wood, "Perforated Elk Teeth on Northern Plains Indian Costumes"; James H. Howard, "The Mescal Cult of the Southern Plains, a Precursor of Peyote"; David B. Stout, "The Concept of 'The Plains' and the Human Relations Area Files"; and Malcolm J. Arth, "Recent Field Work Among the Omaha; A Progress Report."

The final session, with Lehmer in the chair, was a panel discussion of "The Concept of 'The Plains' in Anthropology," by John L. Champe, E. Mott Davis, Preston Holder, Marvin F. Kivett, Richard P. Wheeler, and H. M. Wormington. Working from the time of the Early Hunters up into the Historic period, the panel, with active audience participation, considered many of the important questions currently facing students of the historical anthropology of the Plains.

The business meeting heard a plea from Henry Hamilton of the Missouri Archaeological Society for more public funds in support of salvage archaeology. Richard P. Wheeler of the River Basin Surveys was elected Chairman of the 14th Plains Conference. After the business meeting, Wesley R. Hurt showed slides of his trip to the Lagoa Santa region of Brazil.

* * *

Field parties were very active on the Plains in 1955. Most of the work has hitherto been reported in these columns and will therefore be summarized here.

ALBERTA. The western Canadian Plains are at last receiving archaeological attention. H. M. Wormington of the Denver Museum of Natural History and William T. Mulloy of the University of Wyoming conducted a pioneer reconnaissance of the prairies of southern Alberta, under the auspices of the Glenbow Foundation, in July and August. They were aided by Glen Judd and George D. Volk, and by capable local amateurs whose work provided an effective springboard for the project. Materials from all periods, Early Lithic to Historic, were found, and more intensive work is planned. A report on the 1955 work is planned for publication in late spring, 1956, in the Museum Pictorial Series of the Denver Museum. Further details on the earlier lithic material are given in the Early Man section below.

SASKATCHEWAN. The archaeological program of the Department of Natural Resources of the Province of Saskatchewan, which has been carried on in the field

by Boyd N. Wettlaufer, has been discontinued for the time being. Meanwhile, Wettlaufer's report, *The Mortlach Site in the Besant Valley of Central Saskatchewan*, based primarily on work in 1954, should be out by the time this notice appears, and may be obtained from the Department, at Regina, Saskatchewan.

* * *

In the Northern Plains of the United States the emphasis continues to be on Missouri Basin reservoir salvage, but a good deal of nonsalvage work is being done as well.

MONTANA. Maynard Shumate, Archaeologist, Montana State University, continued surveys along the Missouri River near Great Falls, and found sites dating back to the Middle Prehistoric period.

In the Tiber Reservoir on the Marias River, Carl F. Miller of River Basin Surveys rechecked sites recorded earlier and found most of them destroyed by the reservoir. One, the Galata site, 24TL26, was dug in July and August and contained both ceramic and nonceramic components.

NORTH DAKOTA. The main salvage effort on the Missouri is now in the Oahe Reservoir area, which extends from near Pierre, South Dakota, about 250 miles upstream nearly to Bismarck, North Dakota. Six major sites received attention in this reservoir area last summer, but these are only a fraction of the number which will have to be dug in order to sample adequately this rich section of the valley. In July and August a State Historical Society of North Dakota-National Park Service project under Alan R. Woolworth and W. Raymond Wood worked at the Fort Yates site, 32SI4, also called the Paul Brave site. It is in the Oahe area just north of the North Dakota-South Dakota state line. Two rectangular house variants were found, attributable to the Thomas Riggs focus, considered to be 16th century "Archaic Mandan."

SOUTH DAKOTA. In the Oahe area below Mobridge is the Swan Creek site, 39WW7, where Wesley R. Hurt, assisted by Robert Neuman, dug for a second season in June and July. The project was sponsored by the University of South Dakota Museum, the South Dakota Archaeological Commission, and the National Park Service. Swan Creek is a fortified village and cemetery, with successive components related to La Roche and Rygh.

Waldo R. Wedel and George Metcalf worked in July and August at the Cheyenne River site, 39ST1, in the Oahe area just below the mouth of the Cheyenne, for the River Basin Surveys. This village site appears to have 3 distinct components, the oldest being like Thomas Riggs, the next like Myers, and the most recent like Stanley and Snake Butte. This is the second season at Cheyenne River; one more season should complete the work.

At Buffalo Pasture, 39ST6, just above the Oahe Dam, Carl F. Miller of River Basin Surveys cut a bulldozer trench in September, verifying conclusions reached from earlier work. The site is a single-component village of the Snake Butte focus, probably Arikara of about 1750.

Richard P. Wheeler of River Basin Surveys dug at the Leavitt site, 39ST215, and the Mathison site, 39ST16, just below the Oahe Dam, from July to October. Leavitt has La Roche and Snake Butte components, and Mathison has Monroe, La Roche, and historic Teton Dakota components. The long rectangular houses of the Monroe focus represent the earliest known village complex of the Oahe area, dating probably from the 13th century.

Some sites which are not endangered by reservoir work are being threatened in other ways. One of the major surviving antiquities of central South Dakota, the vast fortified Arzberger village site, 39HU6, was recently damaged in the process of obtaining fill for highway work. The National Park Service has corresponded with the Governor of South Dakota on this matter. Assurance has been given that the Arzberger site will not be further impaired by actions of the State Highway Department, and that the policy of the State of South Dakota is to protect such antiquities wherever possible.

Downstream from Oahe, the 130-mile-long Fort Randall Reservoir is nearly full, and the remaining archaeological work there is perforce limited to the upper reaches, near Fort Thompson, where 2 field parties were busy last summer. In June and July a University of Kansas Museum of Natural History-National Park Service project under Carlyle S. Smith, assisted by Roger T. Grange, Jr., and Alfred Johnson, excavated the Two Teeth village site, 39BF204, and a series of temporary hunting camps nearby called the Skunk Island sites. All these sites appear to be components of the Fort Thompson focus, about A.D. 1700. Nearby is the Crow Creek village site, 39BF11, which was excavated for the second and final season in June, July, and August, by a Nebraska State Historical Society-National Park Service project under Marvin F. Kivett, assisted by David M. Gradwohl. The site has 2 components, the earlier one resembling the Over focus and containing both Upper Republican-like and Middle Mississippi-like material, and the later component being related to Talking Crow D and also possibly to Arzberger. Resemblances of these components with manifestations in Nebraska suggest that the data from Crow Creek will be important in gaining an understanding of the relationships between events on the Middle Missouri and developments during the Middle and Late Ceramic periods in the Central Plains.

Outside the Missouri valley, Paul L. Beaubien of the National Park Service was at Badlands National Monument for a week in September checking sites found by Monument personnel. In this work and in 1953 Beaubien has recorded 43 sites in the Monument, all apparently hunting camps, ranging in time from preceramic into historic times.

NEBRASKA. The Summer Field School of the Department of Anthropology, University of Nebraska, directed by E. Mott Davis, spent 8 weeks from June to early August in the Wildcat Ridge area near Signal Butte in western Nebraska. Test excavations in butte sites and rock shelters produced evidence of occupation from

Intermediate Lithic to Historic times. The most promising site is Sheep Mountain, 25BN1, a butte-top site much plundered by collectors, where additional information on the time of Signal Butte I may yet be obtained.

WYOMING. In early September Carl F. Miller of River Basin Surveys rechecked sites found in previous surveys at the Glendo Reservoir area on the North Platte in eastern Wyoming. Only one site, 48PL14, a workshop area, was recommended for further investigation.

A group of 3 field workers directed by David Gebhard and sponsored by the Roswell, New Mexico, Museum, made a survey lasting from July to September in the Wind River Valley, the Big Horn Basin, and Castle Gardens, and in the area where Wyoming, Utah, and Colorado come together. A major problem under study was that of possible contacts between Wyoming cultures and the Fremont culture. Two particularly interesting sites were located, the first one a petroglyph site near the Dry Fork of Ashley Creek northeast of Vernal, Utah, and the second a Fremont culture site on Vermilion Creek just south of the Wyoming-Colorado line.

Pursuant to the request of Jesse L. Nusbaum, Consulting Archeologist, National Park Service, the Colorado Interstate Gas Company generously agreed to pay the cost of archaeological survey and salvage in connection with construction of its 365-mile gas pipeline from Denver to near Green River, Wyoming, not only on Federal right of way in accordance with the Antiquities Act, but also across all other lands. Advance planning was done by Nusbaum with the aid of William T. Mulloy of the University of Wyoming. Carling Malouf of the University of Montana carried out the main survey and salvage work for the 1955 leg of contract construction, between Denver and Laramie. In the course of jeep travel to pipeline locations and during construction delays, Malouf explored sites up to 3 miles outward from the right of way. The principal result of the project was the accumulation of valuable data on tipi ring sites. Large sections of some tipi ring communities within the right of way were excavated in 4- to 6-inch levels with earth-moving machinery, but no hearths or storage pits were found.

OKLAHOMA. In June and July, Robert E. Bell of the University of Oklahoma and 9 students were at the A. W. Davis site, Mc-6, a mound and occupation structure on the Glover River near Glover, McCurtain County. The site seems later than others found in this area by Barreis in 1941. A report by Rex L. Wilson on this work is to be published in June, 1956, in Volume 4 of the *Bulletin of the Oklahoma Anthropological Society*.

At the University, Sherman P. Lawton has been appointed Research Associate in Archaeology. Stephan F. de Borhegyi is the editor this year of the Oklahoma Anthropological Society *Newsletter*, a monthly publication. The Society will hold its annual meeting on the University campus in the Spring.

Assembled by E. MOTT DAVIS

NORTHEAST

ONTARIO. The Royal Ontario Museum of Archaeology sponsored several projects during the summer of 1955. W. Richard Adams headed a party excavating the Quackenbush site. This is a Huron-Iroquois site located at the eastern end of Stony Lake, Ontario. This same party conducted the preliminary investigation of the Serpent Mounds at Rice Lake, preparing for more extensive work in 1956.

With funds provided by the Quetico Foundation and with the cooperation of the Department of Lands and Forests, Kenneth E. Kidd, of the Royal Ontario Museum of Archaeology, made a reconnaisance of Quetico Park in search of sites. He also visited adjacent areas as far west as Kenora. In addition to visiting the mounds on both sides of Rainy River, he made surface collections, photographed a number of private collections, and recorded pictographs on Irving Island. Kidd also made another photographic record of the petroglyphs near Stony Lake, discovered in the spring of 1954, and of the newly-reported ones at Sparrow Island. The work of surveying the ancient fish weir at The Narrows near Orillia, Ontario, was continued, but was left unfinished due to lack of time on the part of the diver who was cooperating.

NEW HAMPSHIRE. The New Hampshire Archeological Society has excavated a multiple component site on Clark's Island, near Tilton. The materials recovered exhibit certain cultural relationships with those found in New York State and have led to their classification as Archaic, Early, and Middle Woodland.

NEW JERSEY. The Department of Sociology and Anthropology, Temple University, Philadelphia, conducted a field course at a site in west-central New Jersey between June 27 and August 5, 1955. The field work was directed by Ronald J. Mason.

NEW YORK. Nassau County, on Long Island, has purchased a large home, outbuildings, and 6 acres of land in order to convert it into an historical and archaeological museum. This will provide workrooms, store rooms, a library, and laboratory space for the Nassau Archaeological Society. This society will soon have 5 groups in the field.

PENNSYLVANIA. The Upper Ohio Valley Archeological Survey (Carnegie Museum, Pittsburgh) had a party of 7, headed by William J. Mayer-Oakes, in the field from June 15 to September 6, 1955. They partially excavated the Varner site (36 Gr 1), near Waynesburg in Greene County, Pennsylvania. This work was done in cooperation with Waynesburg College, which provided living and laboratory facilities through the generosity of the college president, Paul R. Stewart. A preliminary analysis of the material recovered indicates a multiple occupation of the site. Most of the material represents what Mayer-Oakes labels "Early Monongahela," a part of the late prehistoric period. However, a few European trade articles and Watson Cordmarked pottery (possibly Middle Woodland) have been recovered at this site. In 2 areas of the site, the limestone-

tempered Watson Cordmarked pottery underlies the shell-tempered "Monyock" ware which appears on late prehistoric and historic sites in the area. This is the first historic site to be dug in this region.

The Society for Pennsylvania Archaeology has announced that copies of the "Historic Indian Paths of Pennsylvania" map are available. This was prepared by Paul A. W. Wallace and accompanied his article in the December, 1954, issue of the *Pennsylvania Archaeologist*. Inquiries should be addressed to Vincent R. Mrozoski, 407 Phillips Street, Aliquippa, Pennsylvania.

Assembled by ALFRED K. GUTHE

EARLY MAN

IOWA. Wide publicity in magazines and newspapers was given in August and September, 1955, to the discovery of human skeletons at Turin, Iowa. The locality is a gravel pit within the city limits of Turin and along the east valley wall of the Missouri River. This point marks the extreme southern limit of the high loess-mantled divide between the Little Sioux River on the west and Maple River on the east. In the same sediments but at a lower level were found skeletal parts of bison, and in the underlying gravels were discovered remains of such extinct Pleistocene animals as mammoth, horse, camel, and carnivore. The latter were not associated with either the bison or the human remains, the intervening geologic events representing an unknown length of time.

In justice to the large number of people involved in this event, a fairly complete synopsis follows. The original discovery was made on August 3 by Asa Johnston of Turin while removing a silty loess deposit overlying his gravel pit with a bulldozer, which caused large sections of the bank to collapse. During one of these slides, Johnston noticed an object roll down the slope and recognized it as part of a human skull. He and Merrill Johnson noted that the upper part of the skeleton was dislodged with the skull and that part of the skeleton remained in the bank. Johnston immediately reported the discovery to S. R. Anderson, Monona County Coroner at Onawa, thinking the bones might be those of a local individual who had disappeared some years before. Anderson went to the site, accompanied by Marvin Hudleson, photographer from Onawa. The latter's photographs show parts of the skeleton remaining in the bank, as well as the impression left by the calvarium. Many bone fragments were picked out of the debris at the base of the bank and the rest of the skeleton was removed from its original position. This material was taken to Anderson's office, washed, assembled in articulated position, and more photographs made (*Life*, September 19, 1955).

The following day, Anderson reported the discovery to David B. Stout, anthropologist at the State University of Iowa. Stout asked R. J. Ruppé, who was conducting a State University summer school session in field archaeology at Sanford Museum in Cherokee, Iowa, to check the report. Ruppé asked W. D. Frankforter, Director of Sanford Museum, to investigate with him and they visited the site on August 6, accompanied by 3 students: John Ives, Adrian Anderson, and Eugene Fugle, and by Joe Beals of Cherokee. After they had viewed the bones in Anderson's office, the approximate spot where the skeleton was found was pointed out to them by Johnston and statements were taken from those who had seen the bones in situ.

Examination of the deposit revealed no signs of disturbance which would suggest a burial pit, nor was there any evidence of a secondary fill at this point. The tentative conclusion reached was that the skeleton was contemporaneous with the sediment of the horizon at which it was found, about 15 feet below the modern surface. As the skeleton had been removed by undercutting the bank, a block of sediment was still standing above this spot. It was decided to leave this undisturbed until other scientists could visit the site. Several bones of extinct animals were found in the underlying gravel, and these, along with bison bones from the upper sediments, were taken to Sanford Museum. The bison remains were 8 to 10 feet below and to the west of the human skeleton.

On August 7, Frankforter invited a number of geologists and soil scientists in Iowa and Nebraska to study the site. On August 10, Sherwood Tuttle, geologist at the State University of Iowa, and his son accompanied Frankforter to the site and on a reconnaissance trip in the adjacent valleys. E. C. Reed, director of the Nebraska Geological Survey, also visited the site. Frankforter continued geologic study in the area, as well as fossil collecting. On August 26 Johnston called him to report a second human skull had been discovered and Frankforter investigated it the same day.

The top of the second skull was exposed in a large block of sediment which had dropped from the bank during the night. Excavation was needed to locate the rest of the skeleton, but Johnston's work could not be delayed nor could protection of the find against visitors be guaranteed. C. B. Schultz, Director, and Lloyd Tanner, Curator, of the University of Nebraska State Museum, and Gilbert C. Lueninghoener, Professor of Geology at Midland College, Nebraska, met Frankforter at the site on August 29. The next day E. Mott Davis and Franklin Fenenga, Department of Anthropology, University of Nebraska, G. Hubert Smith of the River Basin Surveys office in Lincoln, and 2 students arrived. The block with the second skull was thoroughly excavated by this party for evidence of a burial pit. Careful troweling revealed the skeleton in flexed position on its left side. Tiny flecks of charcoal were found 13 to 15 inches lower than the top of the skull and a small flint flake about 28 inches below the skull level. The block was reduced and jacketed for transportation to the Sanford Museum. Frankforter remained at the site to plot the quarry face and continue collecting bison bones.

On September 4 Johnston called Frankforter to report the third find, a skull in situ. With an opportunity to study and document the find more thoroughly, Frankforter made calls to F. H. H. Roberts, Jr., in

Washington, Alfred Bailey and Marie Wormington of the Denver Museum of Natural History, W. R. Hurt of the University of South Dakota, and John Champe, University of Nebraska; telegrams were sent to Ruppé, Stout, Carlyle Smith, Carl Chapman, Lloyd Wilford, Preston Holder, Alex Krieger, and T. D. Stewart. This skull was discovered by Bruce Hudleson while his father was taking additional photographs of the quarry face. A portion of the bank had collapsed but part of the skull remained in the bank. Red ocher staining was noted around the skull fragment in the bank and a small shell remained near it.

Champe, Davis, and Fenenga visited the site on September 6, accompanied by Marvin Kivett and Roger T. Grange, Jr., of the Nebraska State Historical Society. G. Hubert Smith, Dean Clark, and Larry Tomsyck of the River Basin Surveys, Smithsonian Institution, were also present. On September 7, Wormington, Schultz, Tanner, Ruppé, and A. L. Lugn of the University of Nebraska met Frankforter at the site and search continued for more bone fragments in the quarry face. Waldo R. Wedel arrived next day and an excavation was begun from the top of the quarry cliff, measuring 8 by 4 feet.

On September 9 as the excavation proceeded, a fourth skeleton was encountered slightly above and to the side of the third. This was an infant, also flexed on its left side; it was jacketed in the matrix and removed. Careful work around the third skeleton was rewarded by evidence of a burial pit, within which were considerable amounts of red-stained earth. When the extent of the pit had been determined, this skeleton was also jacketed in its surrounding matrix and taken to Sanford Museum. All the casts were eventually transported to the State University of Iowa.

The deposit which contained the human remains is a silty loess filling a small valley to a depth of about 35 feet. The basal portion contains reworked till locally derived. One important sedimentary break is represented by a prominent buried soil approximately 6 feet below the modern surface which, in turn, has a well-developed soil on it. The skeletons lay about 15 feet below this surface. The geologic evidence suggests that the fill which contained these skeletons is a correlative of one of 2 terrace fills believed to be contemporaneous with the Mankato and Cochrane glaciations, respectively. If the fill in question is Mankato in age its date may be near 7000 to 8000 years ago; if Cochrane an age of 3000 to 4000 years ago may be expected, according to Frankforter. Geomorphological studies and collection of vertebrate and invertebrate remains is being continued with the hope that they will offer more precise clues to the age of the deposit. Should radiocarbon tests be made on both the human and bison bones, they will reveal not only absolute dates but the rate of accumulation of the sediments, since the human and bison remains were separated by a vertical interval of approximately 8 to 10 feet.

ALBERTA. In May, 1955, Marie Wormington of the Denver Museum of Natural History and Douglas Leechman of the National Museum of Canada began the photographing and analysis of the Russell Johnson collection of stone artifacts at Cereal, Alberta. In July, Wormington returned to Alberta with William Mulloy of the University of Wyoming to begin a more complete study of the large and well-documented Johnston collection. Johnston's voluminous notes represent almost 20 years of intensive archaeological work in an area about which almost nothing has been published. Wormington and Mulloy photographed to scale over 3000 stone artifacts from 166 sites, including such early types as Scottsbluff, Eden, Plainview, Meserve, and Angostura. They were assisted after the first week by Glen Judd.

On July 29, Wormington left Cereal and began investigations in the Edmonton area with her husband, George D. Volk. Meanwhile, Mulloy, Judd, and Johnston made a site reconnaissance in the Little Gem and Antelope Lake areas of Alberta, making test excavations in 3 sites. Although little archaeological material was found because of the great amounts of soil and sand to be moved, these sites were considered important enough for more extensive work. Near Neutral Hills, Mulloy and Judd were shown a number of large groups of stone rings similar to those found in Montana and Wyoming and commonly called "tipi rings." Wormington, however, doubts that they represent habitations and suggests they had ceremonial significance. In the vicinity was also observed a large effigy of a man outlined with boulders. Two other similar examples were reported. Nothing had been known previously of such effigies in Alberta.

It was originally planned to study and photograph the famous Jones collection, containing many hundreds of paleo-Indian artifacts, at Mortlach, Saskatchewan. However, it was learned that it had recently been sold to collectors in the United States. In Edmonton the well-documented collection of Alec Allen was photographed and he acted as guide to many sites, assisting in test excavations as well. Some of these sites promise rewarding stratigraphic studies. Other collections studied and photographed were those of James McGregor, E. L. Smith, Mel Allen, Mr. Coe, and Mr. Dietrich, all of Edmonton, Hugh Bower of Red Deer, Ben Webber of Sedgewick, George Sawyer of Edgerton, and Roy Fowler of Aldersyde; more than 2000 artifacts were photographed.

This survey was financed by the Glenbow Foundation. It revealed a long and complex archaeological history in Alberta, as is to be expected, although no attempt had previously been made to trace the many differences and similarities between the central provinces of Canada and the northern Plains states.

YUKON TERRITORY. From June to September, 1955, excavations were undertaken in Yukon Territory by a field party from the National Museum of Canada, under the direction of Richard S. MacNeish. The site chosen is on the east bank of the Firth River, about 20 miles from the Arctic Ocean, and is known as Engigtsciak. It is on a small plateau adjacent to an erosional remnant at the foot of the British Mountains. Here the canyons of Firth River widen into a valley which blends

into the rolling coastal plain. Along the edges of the valley is a series of ancient sea beaches as well as river terraces. The area of prehistoric occupation is roughly 1200 feet by 600 feet on the top of the small plateau and on its southern slope. Evidently different parts of this plateau were occupied spasmodically or seasonally by small groups of people over a long period of time. These occupations are represented by refuse pits or small depressions filled with refuse, which only occasionally overlap, and by thin lenses of refuse along the slope of the plateau, separated by thin lenses of sand and silt. Establishing stratigraphic sequence was therefore very difficult. The earliest remains found were everywhere buried in sands just above the basic rock of the plateau, and overlain by a thick layer of gray clay. The significance of this clay has not been determined. One geologist suggests it is a marine deposit laid down when the coastal plain was depressed by a glacial advance; another suggests it was a periglacial outwash. Besides animal bones and flint chips, only 10 artifacts were found in the earliest refuse, all of which are choppers, large crude end scrapers, and side scrapers.

Above the oldest deposit and the gray clay is a phase characterized by Angostura points with ripple flaking and a Plainview point; also a few crude prismatic blades, a polyhedral core, 4 crude burins, end and side scrapers, choppers, and bifacial oval blades. The third layer is much like the Cape Denbigh complex and is represented by a large sampling from a number of different occupation areas. However, a number of traits are found which have not been found at Cape Denbigh, and others known at Denbigh were not discovered in this Firth River manifestation; perhaps this phase will have to be subdivided as more material becomes available.

Above the 3 lowest layers are 3 others with 4 different kinds of pottery, microblades, polyhedral cores, and leaf-shaped and stemmed arrowpoints. The pottery consists of cordmarked wares, comb-wiped wares, and fabric-impressed wares, with and without dentate stamping. Another layer above these has Norton Check-stamped pottery, like that of Near-Ipiutak; and the 2 top layers represent fairly recent Eskimo, having connections with Thule culture. Over 8000 artifacts were recovered from the sequence of 9 refuse layers or phases.

IDAHO. Steps have recently been taken toward recognizing the existence of some of the earliest types of projectile points in the Northwest. Thomas F. Kehoe, Museum of the Plains Indian in Browning, Montana, has recently published notes on 5 specimens found near Glenns Ferry along Snake River in southwestern Idaho (*Plains Anthropologist*, April, 1955). One of these is identified as an Angostura point and two as McKean points; one is believed to have been an Angostura before being rechipped; and the fifth is a knife with "ribbon flaking" believed to belong to the same industry as the Angostura point with which it was found.

WASHINGTON. Douglas Osborne, curator of anthropology, Washington State Museum, Seattle, during the summer and fall of 1955 corresponded with Alex D. Krieger, University of Texas, regarding the discovery many years ago of 3 large fluted points in Oregon and Washington. All were found by private collectors but no attention was paid them until Osborne noted them and attempted to establish their authenticity. Careful examination of the specimens by Krieger, including the possibilities that one or more of them might be fraudulent, has so far resulted in the opinion that all are probably acceptable as authentic examples of the Clovis fluted point type. This type, then, appears to have existed in Oregon and Washington, an interesting addition to the already wide distribution of this point in North America. The details of discovery and manufacture of the specimens are being published by Osborne.

TEXAS. From October 23 to November 6, 1955, Fred Wendorf resumed excavations at the Scharbauer site near Midland, Texas, where the now-famous "Midland Skull" was discovered in 1953. The excavations of Sellards in November-December, 1954, (see: Fred Wendorf, A. D. Krieger, C. C. Albritton, and T. D. Stewart 1955, *The Midland Discovery*, Fig. 35) had revealed an area of occupation in the gray sand northeast of the point where the skull was found. Wendorf, sponsored by the Museum of New Mexico, decided to expand the excavation of the area outlined by Sellards, primarily to discover in situ, if possible, some artifacts which would be of more critical value in dating the human remains than any of the flakes, scrapers, caliche hearth stones, and so on, that had been found previously. Wendorf succeeded in finding 2 flake scrapers, 2 hearths of caliche rocks, and workshop evidence in the form of small flint chips, all of which should be more or less contemporaneous with the human skull, and which prove that the gray sand was not an aquatic deposit, but a small dune which was being built up while human beings occupied the area. In addition, Wendorf found, on the last day of his dig, an example of the kind of projectile point termed "unfluted Folsom" in the Midland book. Such points are like the classic Folsom in shape and dimensions, but simply are too thin to have been fluted. This specimen was found on a screen but Wendorf states there is no doubt it came from within the gray sand at about the same level as the other objects mentioned above, and that it likewise should be roughly contemporaneous with the skull. This discovery raises a number of questions about the skull and its original interpretation. Was it contemporaneous with unfluted Folsom points and — by implication — with the Folsom horizon? Was the red sand which covered the site of the skull and artifacts in the gray sand of local origin, blowing over the site during a short change of climate which had no wider implications? Could the various Pleistocene animals which had about the same chemical content as the human bones have lasted until as late as Folsom times? In December, Wendorf and Krieger began a short paper on the new Midland work, planning to release it when further radiocarbon datings are available on the associated vertebrate and inverte-

brate fauna. One fact is hardly questionable: that the Midland skull cannot be more recent than the Folsom period.

ARIZONA. A new early man "kill" site was investigated by the Arizona State Museum in December, 1955, on the ranch of Mr. and Mrs. Ed Lehner in the San Pedro valley near Hereford, Arizona. The presence of bones protruding from an arroyo bank was called to the attention of the Museum 3 years ago and the exposure of additional bones due to erosion in the summer of 1955 called for systematic investigation. The removal of 3 m. of overburden was accomplished through the cooperation of Warren Jay, Cochise County Supervisor, who made available a power shovel. The excavations were concentrated in the center of the bone bed which covered an area of about 5 by 10 m. Elements of at least 8 mammoths, mostly immature animals, and of one bison have been recognized. Thirteen projectile points and 7 cutting and scraping tools were recovered among the bones. The majority of the points are of classic Clovis type, closely matching in every particular those recovered at the Naco station in 1952. Three points made of clear quartz, while still in the Clovis tradition, are small, measuring from 3 to 4.5 cm. in length. The small size and the lack of developed basal channeling appear to be due to a limitation of the material rather than the product of a different concept of projectile manufacturing.

The physical conditions of the site indicate that the animals were attracted by the water in a small stream channel, where they were felled and butchered. The vertical distribution of the bones through a bed 1 m. thick, locally grading from gravel to clay, suggests intermittent killing. The matrix, in addition to the bones and tools, contained charcoal in varying concentrations possibly derived from nearby fires. Ernst Antevs, who has assessed the geology, believes this locality to be about the same age as the Naco site and places it in the Pluvial more than 10,000 years ago. Those participating in this work included William W. Wasley, who was in charge of the excavations, E. B. Sayles, John Lance, Emil W. Haury, and 10 students from the Department of Anthropology, University of Arizona. Fred Wendorf, of the Museum of New Mexico, and Thomas E. Lee, of the National Museum of Canada, Ottawa, visited the site during the course of the work.

NEW MEXICO. An exhibition, "Early Man in the Southwest," opened August 6 at the Museum of New Mexico in Santa Fe. Prepared by Marjorie F. Lambert, this exhibit portrays the leading Ice Age cultures of the southwestern United States which existed between 20,000 and 7000 years ago, graphically illustrated by attractive displays, maps, diagrams, and charts. Mrs. Lambert states that the Midland skull brought about this display when Keith Glasscock, its original discoverer, agreed to present the skull to the Museum of New Mexico as a 10-year loan if a suitable installation could be arranged. In addition to the Midland display, there are others on Sandia Cave, the Clovis, New Mexico, elephant hunters, and the "Yuma" culture of 9000 to 7000 years ago.

BRAZIL. During the period August 7 to September 13, 1955, Wesley R. Hurt, Director of the W. H. Over Museum, University of South Dakota, made a survey of archaeological sites in the area of Lagoa Santa, Brazil, financed by a grant from the F. W. Hatterscheidt Foundation. Between 1825 and 1880, Peter Lund attracted world-wide attention to this area when he reported the remains of some 115 species of Pleistocene animals in the caves, many of them in association with human remains. A human skeleton was found in 1935 at Confins Cave by H. V. Walter, buried under sediments of an extinct lake. At Lagoa Funda Cave, Walter found deep deposits of human occupation levels, bones of extinct animals, and a skull resembling that from Confins Cave. These discoveries have not, however, been generally accepted by anthropologists because of uncertainties about the manner of excavation and the possibility of a late survival of Pleistocene fauna. Hurt visited these and other localities in preparation for an extended research program in 1956 in cooperation with the National Museum of Brazil and other institutions. The old discoveries are to be re-evaluated and new excavations opened for more controlled information.

Assembled by ALEX D. KRIEGER

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